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SCRAP BOX

By BILL WINTER

"SURE speed is dangerous," says Earl Clayton, well-known builder from Salem, Oregon, "but so is free flight. Free flight gassies can pick up 70 mph in an earthward dive, and there are more pile-ups in free flight than from speed jobs 'blowing up' or shedding their lines, but since speed jobs can be dangerous, what can be done about them?"

Cayton obviously is teed off over the pessimists who regard straight speed as a lost cause. But he is not a die-hard speed merchant, so his comments may be considered an impartial opinion. Okay, Earl, have your say.

"Such schemes as creating rules to slow down planes, such as requiring all speed jobs to be biplanes, etc., won't go over with the average speed merchant. He wants a free rein in experiments toward greater speed.

"During the past year speeds have been rounding off," Earl goes on, "as maximum efficiency is reached in reciprocating engines. Speeds will increase some but not enough during the coming contest season to materially increase danger.

"The present rules for .001 line diameter for 2 oz. of model are not satisfactory because they force modelers to build lighter, hence more frail, models that literally explode in the air. Why not go back to the 20 G (or higher) pull test? This can be done every time the builder enters the circle; lines kinked between flights will then be tested. Bell cranks and other items that may have been damaged will be rechecked." While on the subject of safety, Earl, crediting Walker's fence idea, says that it isn't practical for some clubs. Most local contests have three circles for speed and clubs keep changing flying sites which means portable fences are essential. He thinks most clubs lack storage space. Since most contests permit 15-20 feet when jobs are clocking in, a break away will clear the fence. So what does Cayton suggest?

"Speed jobs are most dangerous within the first 50 feet of the circle—from there on torque takes over and these small jobs tumble end-over-end, hardly being more dangerous than free flight. Near the circles, modelers know what is going on. This is not true of the spectators, who are permitted to become jam-packed close up to the circle. A model on the loose then means trouble. To sum up," concludes Cayton, "a good pull test should be given a model prior to each flight, and some thought be devoted to keeping spectators at a safe distance."

Learning to loop is no problem in some parts of South Africa. Huge plateaus like dumps remain wherever men have burrowed in the Rand for gold. With space enough on top for twenty rings—(if any-one wanted them!)—these hills are some 70' high with steep sides. All you do to loop is stroll over to the edge and do your looping out in space. If you come out ten feet under, well you still come out! There are many strange things about modeling in the Transvaal so we'll let S.W. Wantin fill in the picture.

"At 6,000 feet we need the best motors we can get," says Wantin, "*Ohlsson 23's* we were able to get have worked out very well. Though their new 29's are on the market, import control makes them exceedingly remote for us. We couldn't buy them anyway because the cost to us here would run ten times their original value. We can, however, receive them and other engines as gifts. Anything your fellows would like to have from South Africa as curios we would gladly swap for these engines. No elephants, lion skins, prehistoric men, or full-sized models of Table Mountain, please! Any native crafts, etc., that are not too bulky can be sent, not necessarily on a dollar-for-dollar basis either because we just want to get engines!"

There is a feud in the Transvaal, according to Wantin. Puetonia and Genniston have been having it out for years in free flight but the latter is now getting its lumps in controliner due to none other than our own Davey Slagle. Seems Davey corresponds with the guys from Puetonia and . . . Any-one willing to save the honor of Genniston —or get a lion skin into the bargain—might

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A few members of the *Flying Bisons* of Buffalo talk things over. Left to right are Harry Keller, Norris Moultby and Jim Miller. Scale model of *Buster* is powered by *Vivell 35*

MODEL AIRPLANE NEWS

Serving Aviation 20 Years

JULY, 1949 VOL. XLI—No. 1

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Published monthly by Air Age, Inc., Mt. Morris, Illinois. Editorial and Advertising offices: 551 Fifth Ave., New York 17, N.Y. Jay P. Cleveland, President and Treasurer; Y. P. Johnson, Vice Pres., G. E. Johnson, Secy. Entered as second class matter Dec. 6, 1934, at the post office at Mount Morris, Ill., under the act of March 3, 1879. Additional entry at New York, N.Y. Price 25¢ per copy in U.S. **Subscription Rates**—Within U.S. only: 1 yr. $2.50; 2 yrs. $4.75. In Canada: 1 yr. $3; 2 yrs. $5.75. All other parts of the world: 1 yr. $3.50; 2 yrs. $6.75. **Change of Address**—Four weeks' notice required. Be sure to send your old address (preferably imprint from a recent issue). Give new postal zone. Write to: Subscription Dept., Model Airplane News, 551 Fifth Ave., New York 17, New York.

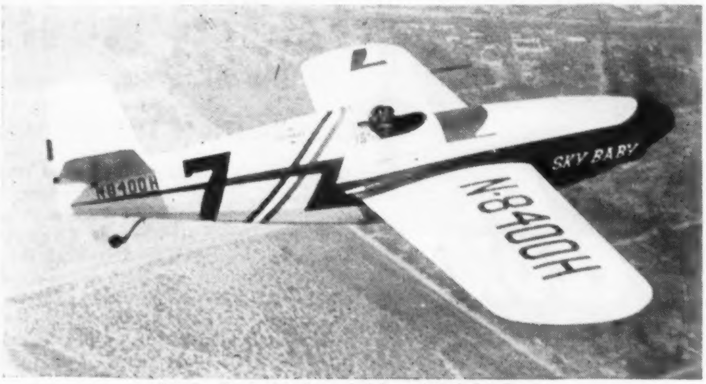
REPORT FROM THE WEST

by Lew Mahieu

THE inside story on Art Chester's death is the highlight of our column this month. We will also report on the Bakersfield Free Flight Gas Contest and the Team Racing meets sponsored by the F.A.S.T. Club.

Everyone who knew, or knew of, Art Chester was saddened by the news of his tragic death. Art, famous for his plane racing, was a tradition with all Americans young and old alike.

Bob Heisel, another fine flier and a Marine fighter pilot during the war, was also killed at San Diego on that tragic April 24.



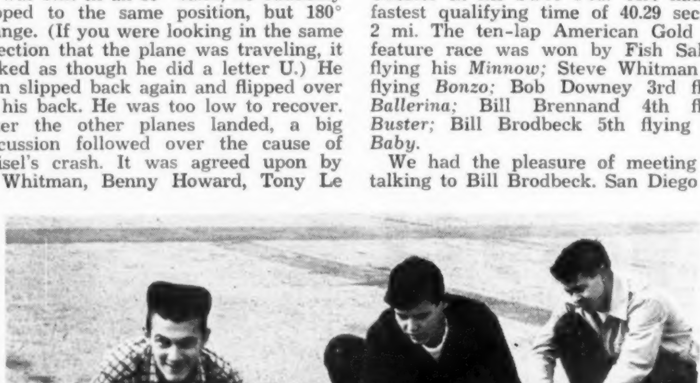
Bill Brodbeck, brother of Johnny "K & B" Brodbeck, flying his *Sky Baby* at the San Diego Air Show

It will probably be of interest to our readers to know what caused these two masters to meet such an end.

In the eight lap race over the two-mile rectangular course, the boys were fighting for first position and flying low, at an altitude from 5 to 30'. Just as Bob Heisel was completing a pylon turn and while he was still in an 85° bank, he suddenly slipped to the same position, but 180° change. (If you were looking in the same direction that the plane was traveling, it looked as though he did a letter U.) He then slipped back again and flipped over on his back. He was too low to recover. After the other planes landed, a big discussion followed over the cause of Heisel's crash. It was agreed upon by S. Whitman, Benny Howard, Tony Le Vier, Art Chester and the CAA that it was pilot error. He was probably caught in the turbulent air of the prop wash from the ship just ahead of him, which would cause a high speed stall with no control over the plane. So the meet continued, but in the very next race, Art Chester did the same thing. Another discussion was held and it was decided to continue the race. We later received word from Tony Le Vier, President of the Professional Race Pilots Association, that the Civil Aeronautics Board had announced the probable cause of Chester's crash as due to his harness being too loose, or that he got caught in Whitman's prop wash. A loose harness could easily have been the trouble, because those little jobs are tricky, and with only 66 sq. ft. of wing area they really bounce around at 180 mph.

The two lap trophy dash was won by Bob Downey No. 5, followed by Art Chester in his *Swee Pea*. Art had the fastest qualifying time of 40.29 sec. for 2 mi. The ten-lap American Gold Cup feature race was won by Fish Salmon flying his *Minnow;* Steve Whitman 2nd flying *Bonzo;* Bob Downey 3rd flying *Ballerina;* Bill Brennand 4th flying *Buster;* Bill Brodbeck 5th flying *Sky Baby*.

We had the pleasure of meeting and talking to Bill Brodbeck. San Diego was



Keith Story, P. Conrad, and Keith Conrad line up their team racers for take-off

First place man in April 10 Team Race at Santa Anita was Rudy Panko of Baldwin Park, shown here with his winning *Pete*

his first race and from the way he handles the *Sky Baby* he will be on top in no time. Bill is Johnny (K & B) Brodbeck's brother.

A few of the requirements of a Goodyear Racer are: fixed gear, weigh not less than 500 pounds with a maximum wing loading of 12 lb./sq. ft. Engine must have a displacement of less than 190 cu. in., propeller must have fixed pitch. They are allowed to experiment with propellers and fuels only.

An interesting added attraction at the meet was the race between Danny Oaks running his Offenhouser midget car record holder and Bill Spruer flying No. 19, the *Brown Special*. From a standing start Danny Oaks finished about 1/8 mi. ahead of the airplane over a two-mile course.

* *

Who Done It?—Dennis Davis of San Diego upped the Class "C" free flight open gas record to 30:00. Yes, Denny had three beautiful ten-minute flights at the Eleventh Annual Bakersfield Free Flight Gas Contest April 10, 1949. The meet was very well attended with 175 entries. The first place winners were: ½ *A*, Ted Peukert 9:05.7; *A*, Bob Hanford 21:58.4; *B*, Fred Morgan 24:54.1 (which is a new record in the *Jr.* Class); *C*, Dennis Davis 30:00—record; *D*, Fred Grinder 22:11, a new record in the *Sr.* class. We saw a lot of friends and interesting people there. Ocie Randall finally splattered that sailplane of his. It must have been nine years old because where it hit there was only a fine dust scattered around. We saw the editor of the WESTERN MODELER, Jim Saftig, looking over the contest. About a week later we learned that the WESTERN MODELER had a bad fire and the plant burned to

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E. S. Hartramft won April 24 Team Race with this sleek original design ship

NAVAL AVIATION is fighting the battle for its life! The battle is not against Jap aircraft (which it licked) nor against any other agressor nation's naval air power (which it *could* lick) but it is with the U. S.'s own Air Force. The combination of the resignation of John L. Sullivan as Secretary of the Navy (and a fighting friend of Naval Aviation), the 65,000-ton carrier *United States* cancellation, and the decisive cutbacks in fiscal 1950 appropriations are heavy bodyblows from which some observers are convinced it will never recover. No less an authority than Vice Admiral John D. Price, Deputy Chief of Naval Operations for Air, says that at the 1950 rate of procurement, Naval Aviation will be reduced from its present 15,000 airplanes to only 3000 by 1955.

SECRETARY SULLIVAN resigned not over the cancellation of the super-carrier but because of the manner in which this important decision was made. Sullivan actually received his first news of the carrier cancellation from the morning newspapers! Secretary of National Defense, Louis Johnson, had asked the Navy for a tactical and strategic justification of the new carrier a few days previously and before this could be submitted Johnson personally decided to cancel the giant vessel. In the face of such arbitrary authority, Sullivan could only resign. And his resignation coincided with that of Secretary of Army Royall's. Secure in his post is Secretary of Air Force Symington and the entire Air Force, whose B-36 bomber has captured the imagination not only of Johnson, but of the Congress and the nation as well.

THE NAVY Bureau of Aeronautics was caught in a vulnerable position by the sudden shift in Congressional interest. Last year naval aircraft procurement was held to a minimum and a substantial number of World War II aircraft were removed from storage and placed in active carrier groups to provide the fighting force authorized. This was done as part of a plan to ask and receive a commensurate increase in 1950 procurement authority. Now the House Appropriations Committee has turned thumbs down on the increase, and, as a result, the Navy will be able to buy only 843 new aircraft next year. This small quantity is made up of 608 Grumman F9F *Panther* and Vought F7U *Cutlass* fighters, 134 North American AJ and Grumman AF attack planes, 51 Lockheed P2V *Neptune* and (perhaps) Convair P5Y turboprop patrol planes plus 5 transports, 35 helicopters and 10 trainers.

MORE SERIOUS effect of the cut, however, is that it will force the Navy to cancel five experimental prototypes, now under construction, and delay the development of four others from four to nine months. Thus, the Navy will not have the advanced types available for procurement in the coming years and its future technical growth is cut off at the very roots. Cancellation of the super-carrier also forces abandonment of development on the new large attack and bombardment aircraft (up to 100,000 lb. gross weight) designed for operation from the long, broad decks of the craft.

BUT AIR FORCE received Congressional approval for the purchase of 2,550 airplanes at a cost of $2,217,000,000! This figure is actually $851,000,000 more than the President asked Congress to provide. The effect of this new program is to increase the Air Force from the President's 48-group plan to 58 groups by adding five medium bomber, three fighter, one light bomber and one troop carrier groups. This means that the U.S. Air Force at full strength would possess 3 heavy bomber, 16 medium bomber, 6 strategic reconnaissance, 2 light bomber, 20 fighter (day), 3 all-weather fighter, one tactical reconnaissance and 6 troop carrier groups, plus 10 separate squadrons comprising the final group. Included in the new program is $18,000,000 for research and development work on supersonic bomber studies, interceptor fighter development,

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20 YEARS

by Bruce Wennerstrom and Charles Ziehl

"IN presenting MODEL AIRPLANE NEWS to the reading public, it is fitting that we dedicate its pages to America's greatest investment and finest possession—our boys and girls." So read the editor's *Message to the Mothers and Fathers of Young America*, with which the initial issue of MODEL AIRPLANE NEWS was launched.

The ensuing twenty years have seen a "pastime" for boys and girls mature into an organized scientific sport that boasts over two million devotees of all ages; twin pushers have given way to 150 mph controline jobs, and MODEL AIRPLANE NEWS has become the first and foremost magazine devoted exclusively to model aviation.

The first issue of M.A.N. was a far cry from the magazine on the newsstands today. Plans were all full size and often ran a dozen or more pages per model. Nails were driven

OF M.A.N.

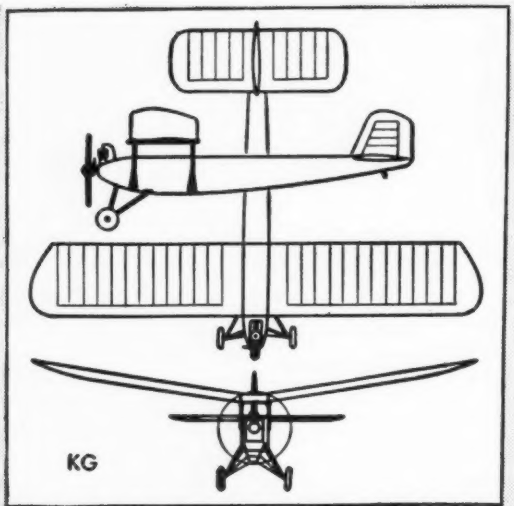
into the plans at points indicated by 1/8" black dots (these plans were really complete) to hold the steamed white pine longerons in place while the ambroid dried. Wing tips were bent of reed and bound with thread. Brads were liberally used to hold things together. In spite of this heavy construction, the flights claimed were rather spectacular. In fact, we rather suspect some of the performance reports may have been written by M.A.N.'s fiction authors.

The tall tales dreamed up by these authors of the past were really something. As a sample—"Karper's saturnine face froze in horror as he realized the other's intention. His shriek of terror was unheard in the fearful noise of the engines, beating like a thousand savage drums. In a frenzy he tugged at his trigger. But Malloy, blood streaming from a dozen wounds, held his stick in position. On and on he came. Steel jacketed wasps burned

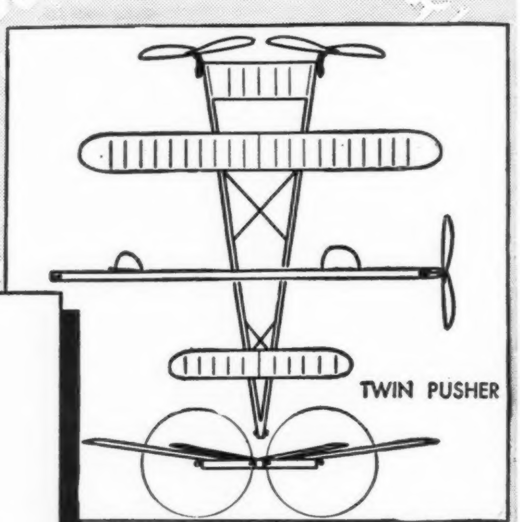
(*Turn to page 36*)

LOOKING

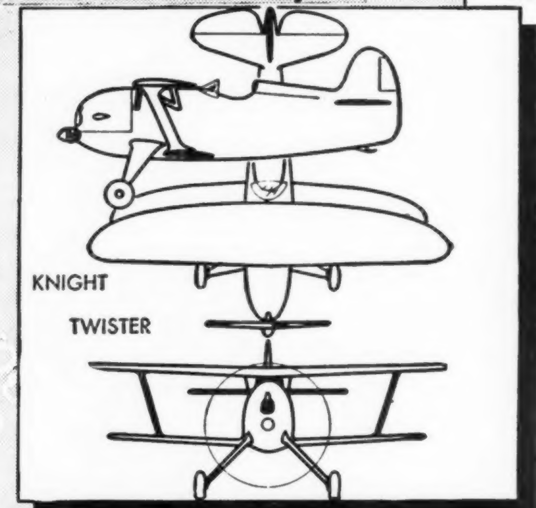
From among the hundreds of outstanding planes that have appeared in Model Airplane News in the past, the models on these pages were selected for this special anniversary feature because they were not only contest winners but showed unusual design and originality as well. Bruce Wennerstrom and Charles Ziehl were commissioned to select and prepare these special 3 views.



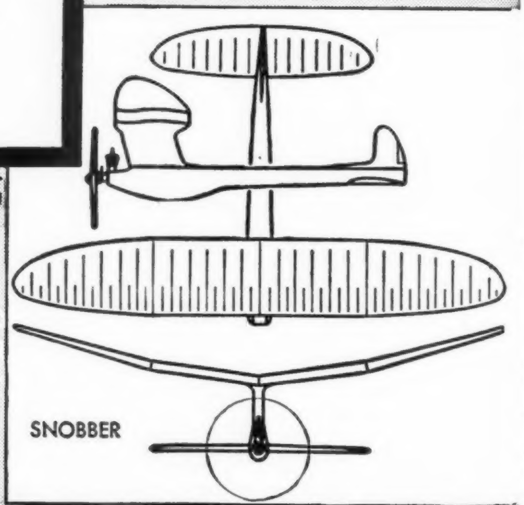
"Old Faithful", the *KG* is now almost a modeling legend. Kovel-Grant team designed and built this 8', 7 lb. job when twin pushers were just going out. Ran in April-May '35 issues of M.A.N.; set worlds record of 64:40 in Aug. 1935.



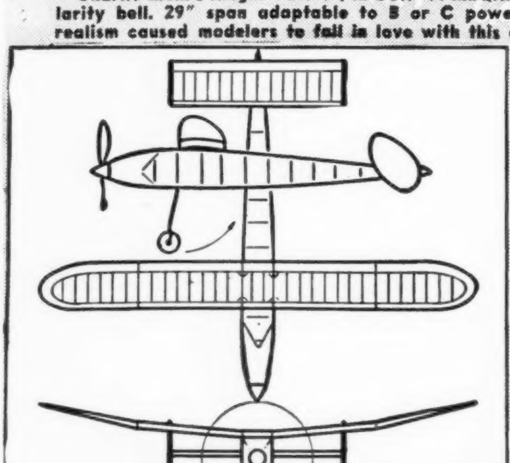
August Ruggeri's twin pusher took second in Mulvihill Event at '33 Nats with 7:36, first prize going to Bassett's gas engined ship. Poor glide doomed twin pushers. Span front 18" rear 36"; length 40"; Aug. '34 M.A.N.



Charlie Ziehl's *Knight Twister*, in Oct. '44 M.A.N., rang the popularity bell. 29" span adaptable to B or C power, plus exciting realism caused modelers to fall in love with this dream ship.

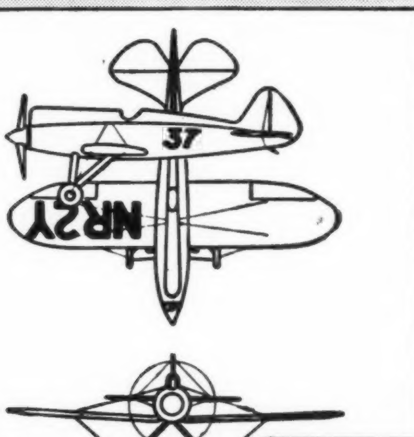


Built when pencil bombers were in their infancy, Dick Everett's *Snobber* is indicative of general features of a type which caused uproar for a year. Large lifting stab and minimum cross-section gave phenomenal soaring flights. Span 55"; length 33½"; B engine. Feb. '45 M.A.N.



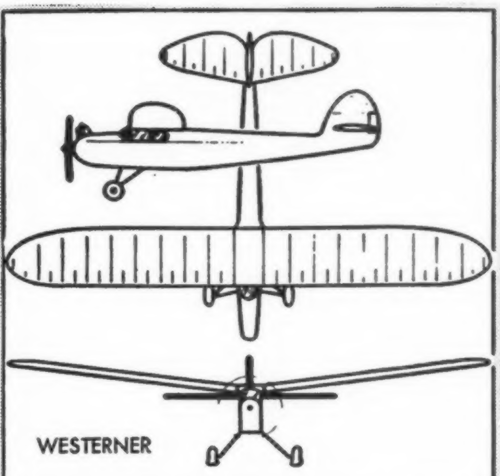
Ray Beaumont's *Thermal Chaser* successfully snagged a few for it won both the Stout and Moffett events in the '41 Nats. A clean box, it had *Topper*-type wing, single bladed folding prop, retracting gear, 36" span. Ran in Oct. '41 M.A.N.

BACK....



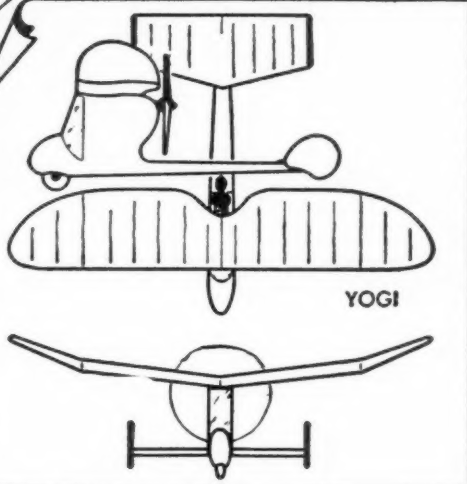
PETE

Frank Ehling, well know to M.A.N. readers thru his many articles, did this stick control-line adaptation of Howard's Pete for .19-29 engines in the Oct. '45 issue. Shows realism possible in scale U-control. Span 30"; length 27"



WESTERNER

Elbert (Mystery Man) Weathers is well known for his high performance models usually incorporating an uncommon feature or two. This, the original Westerner, ran in the May-June '38 issues of M.A.N., had 8' span, 58½" length, C engine, amazing performance

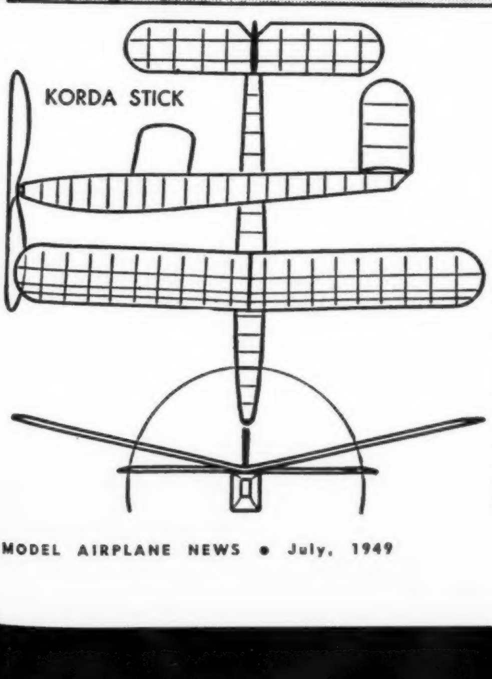


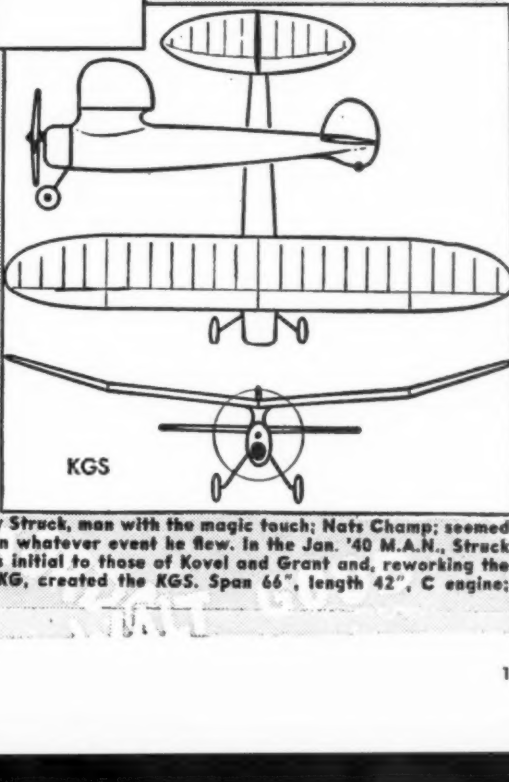
YOGI

Jerry Stoloff's unique class A pylon pusher astounded the experts by not only flying but winning contests as well. Span was 42", length 30". Featured in the Oct. '44 issue of M.A.N., its popularity warranted Eagle Models putting it out in kit form

"That man" Korda, tops in rubber, towline glider, and gas, set world record of 24:40.8 in "C" stick class in '35 with this ship. Span 29⅝", length 24", 15" free wheeling prop; Nov. '35 M.A.N.

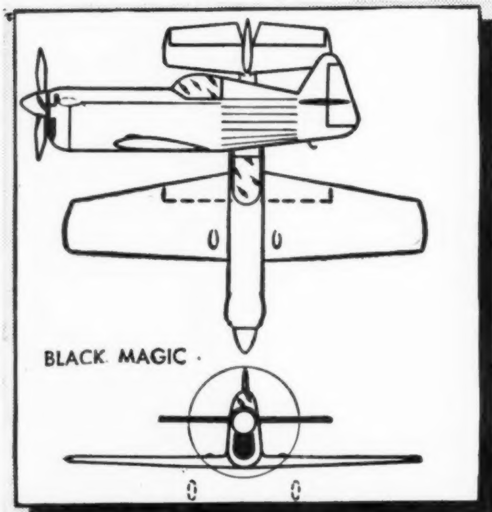
KORDA STICK





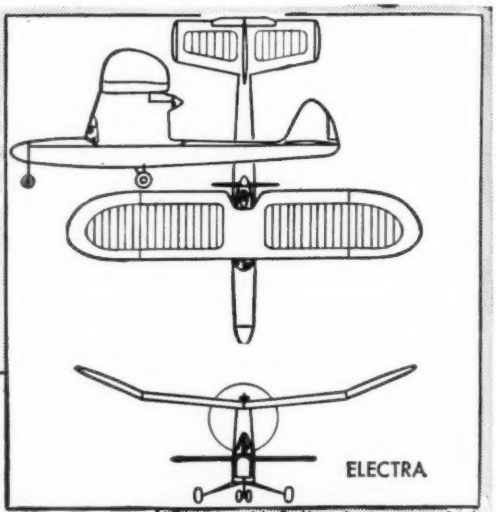
KGS

Henry Struck, man with the magic touch; Nats Champ; seemed to win in whatever event he flew. In the Jan. '40 M.A.N., Struck addd his initial to those of Kovel and Grant and, reworking the classic KG, created the KGS. Span 66", length 42", C engine; 33 oz.



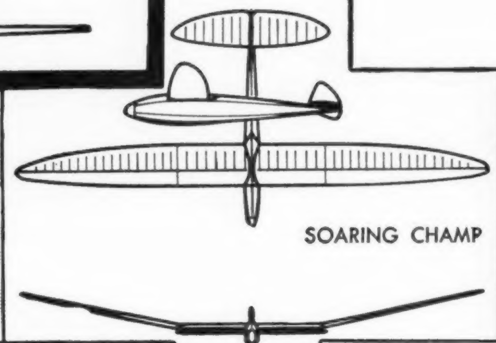
BLACK MAGIC

Ahead of its time, this clean job by Bruce Wennerstrom was real magic with a whole bagful of tricks. Had retractable gear, flaps, experimental CO2 J.A.T.O. units, fully cowled engine. Meets present day team racing rules with 125 sq. in. effective wing area, .299 engine, cockpit and realistic lines



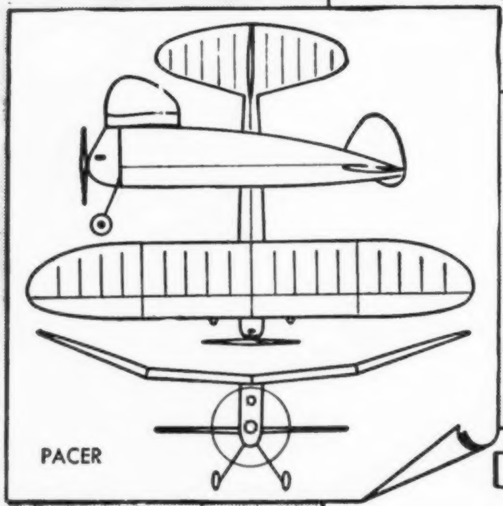
ELECTRA

Claude McCullough approached radio control with this unorthodox but practical R.C. design. The 14 lb. 8' giant was 7'4" long; used Grant X airfoil; powered by ¾ H.P. Avion Mercury engine. March '47 M.A.N.



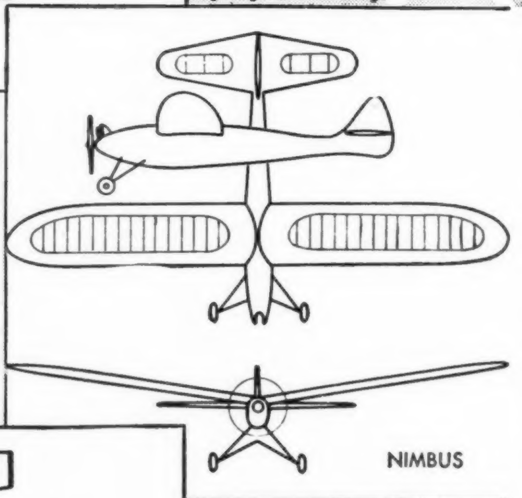
SOARING CHAMP

Philadelphia's Ray Beaumont designed this slick soarer which ran in the March '43 M.A.N., then was included by Frank Zaic in his book "Model Glider Design." High aspect ratio, 78" wing; sheeted leading edge and fuselage



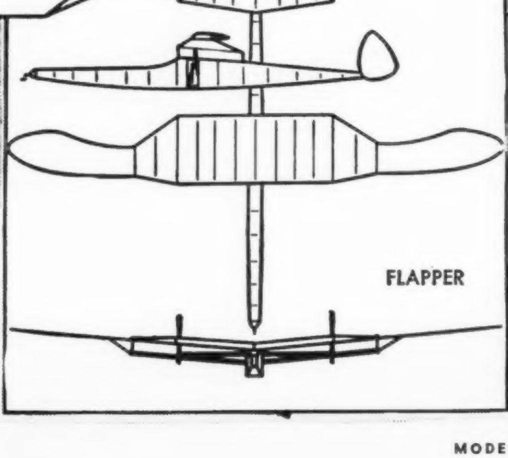
PACER

Sal Taibi's famous *Pacer* was a winner in both B and C classes. Bay Ridge made kit of C version scaled up from this, the original record making *Pacer*, which ran in the Feb. '41 M.A.N. Pacer-man Taibi also designed the *Powerhouse* and *Hornet* featured in earlier issues of M.A.N. *Pacer B* had 53" span, *Forster* 29 engine, reverse camber stab



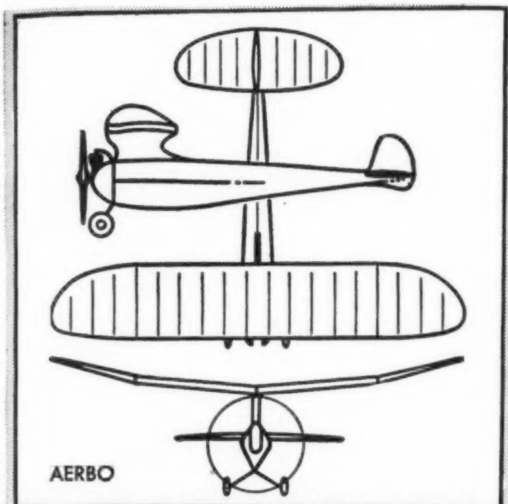
NIMBUS

Bantam engine designer Ben Shereshaw, who engineered models as well as engines, was famous in both fields. His *Nimbus* which appeared in the June '37 M.A.N. was similar to *Cavalier*, and was designed along sailplane lines. 10'3" span, 6' length, rugged monocoque construction

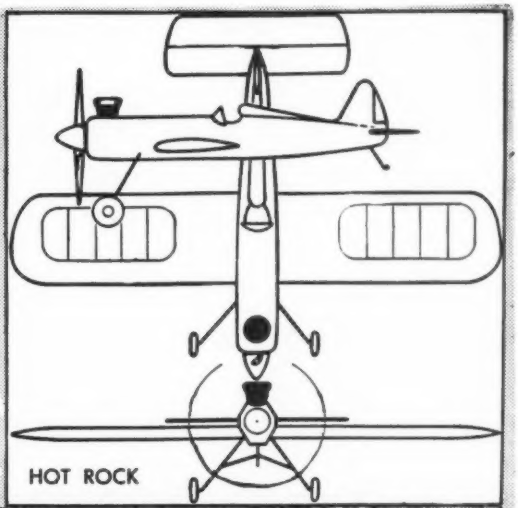


FLAPPER

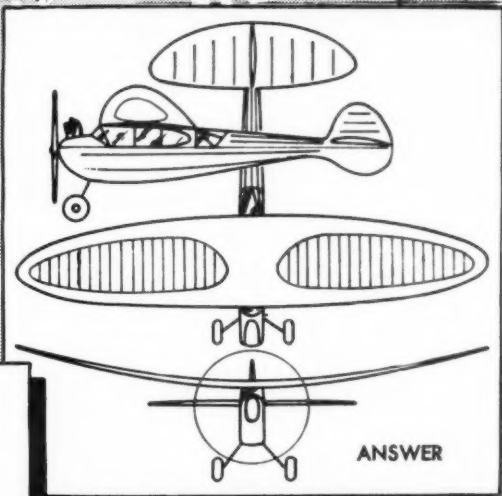
Art Horak's "what-is-it." This "believe it or not—it flies" job not only flew but flapped its way to both Junior and Senior Ornithopter records. Similar to European designs. Span 38", length 28"; July '45 M.A.N.



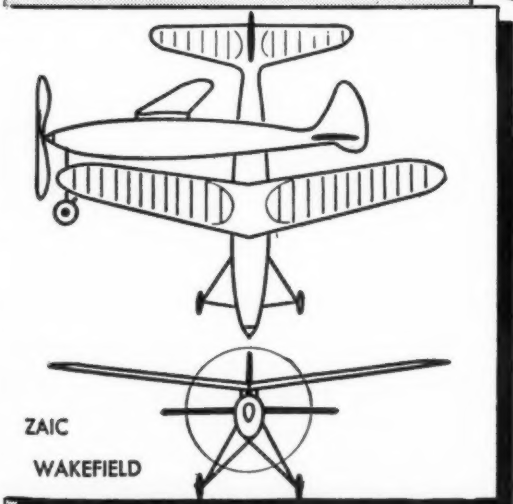
Two time Nat's winner, John Findra's *Aerbo* took class A in '39 and '41; M.A.N. readers saw the plans in Nov. '41. *Aerbo* is good example of simply built pylon job characteristic of the period. Span 40", length 32". *Bantam* engine swinging 9" prop



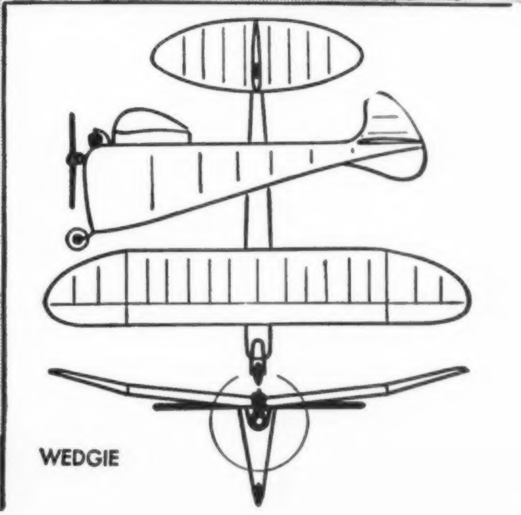
'47 Nat's Open Stunt winner was Bob Tucker's *Hot Rock*; featured in March '48 M.A.N., ship had typical stunt model features; symmetrical airfoil, plus lots of area; short stub moment arm; *Drone* diesel engine. Span [illegible]", length 27"



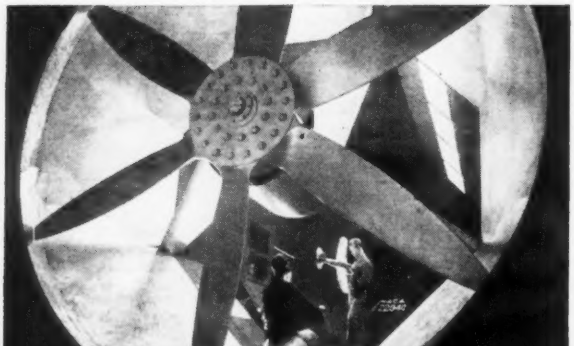
Gordon (Scotty) Murray, killed at Malta during the war, designed the *Answer* which popularized a sparless, thin, high-lift wing. Ship averaged 1:50 for 1940 class A record. Later sold in kit form as *Topper*. Span 44", length 31½". August '40 M.A.N.



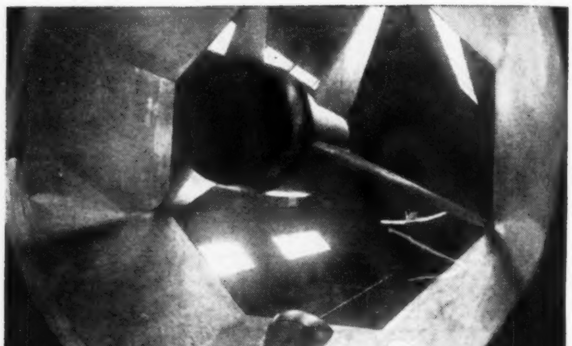
Frank Zaic's '34 Wakefield entry was early example of streamlined tractor design. Proxy flown in England, it placed third. Unique feature was geared rubber motor which allowed 3 minute prop run. Had monocoque fuselage, 44" span 34½" length. August '35 M.A.N.



Built along C. H. Grant's low-C.L.A.-school-of-thought lines, Leon Shulman's *Wedgie* bore out the soundness of such design by taking class A in the '40 Nat's with over 22 minutes. 42" span, 33½" length. November '40 M.A.N.



NACA free flight tunnel. Note observer standing in cockpit just ahead of fan



Corsair model "flying" during control and stability investigations

Longitudinal Stability

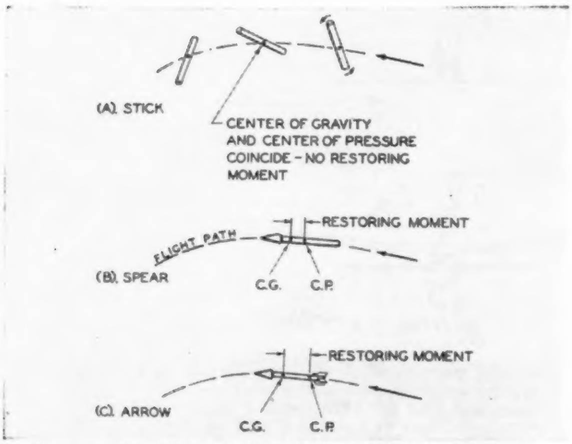


Fig. 1 A plain stick is unstable in flight. Addition of weight makes it stable, and even more stability is had by adding fins at the tail

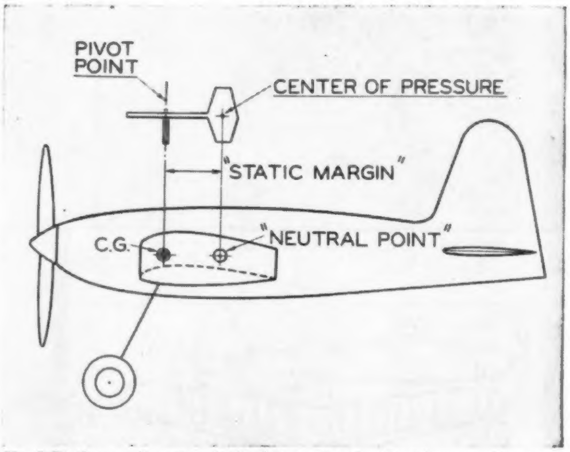
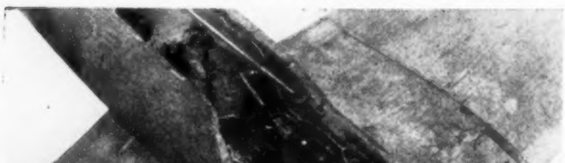


Fig. 2 Static margin and neutral-point may be visualized from weather vane; C.G. equals vane pivot point. Static-margin is thus tail length of the vane



Motor is mounted in nose of *Corsair*. Fuselage carries solenoids connected to all control surfaces—this enables simulation of actual flight

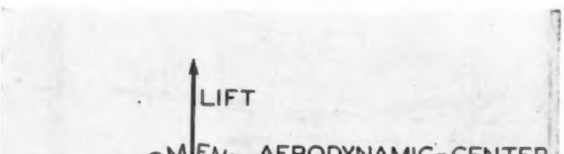


Fig. 3 Forces acting on airfoil—lift, drag, and pitching moment—are said to act at the aerodynamic center, located at about the chord quarter-point

by R. G. NAUGLE

A B-36 AND a balsa wood model are sisters under the skin. Regardless of its size, speed, weight, or power, a model obeys the same laws of aerodynamics as does the largest bomber when it comes to stability and steadiness in flight.

Model builders don't have the elabroate facilities or the thousands of man-hours of engineering time that a builder of bombers has. But they do have a friend in the form of the N.A.C.A. Free Flight Wind-Tunnel (Langley Field, Va.), where small balsa-wood models fly freely in a blast of air that keeps them suspended in space while the "pilot" watches from the outside. By varying the air speed and tilting the tunnel, a wide variety of flight conditions can be simulated. Electric power is carried to the model by a light copper trailing wire; by energizing a system of magnets within the model, the pilot can move the control surfaces and cause the model to climb, dive, or turn as he wishes.

These tests, of a qualitative nature, are then coordinated with tests of the same model mounted on the tunnel balances which measure the actual forces and moments and which when transformed into coefficient form can be used by designers in arranging and laying out new designs. Certain rules have thereby been set up which define good, fair, and poor flying characteristics in terms of these coefficients. Thus, for the first time, a direct relationship has been established between the observed stability of free flying models, their aerodynamic arrangement, and standard aerodynamic coefficients.

Take the age-old problem of static longitudinal stability. It is absolutely necessary that a model be *inherently* stable—for while a pilot may be able to control an unstable airplane, a model will crash immediately when unstable. A model then, must have greater inherent stability than a full size airplane,

PART ONE

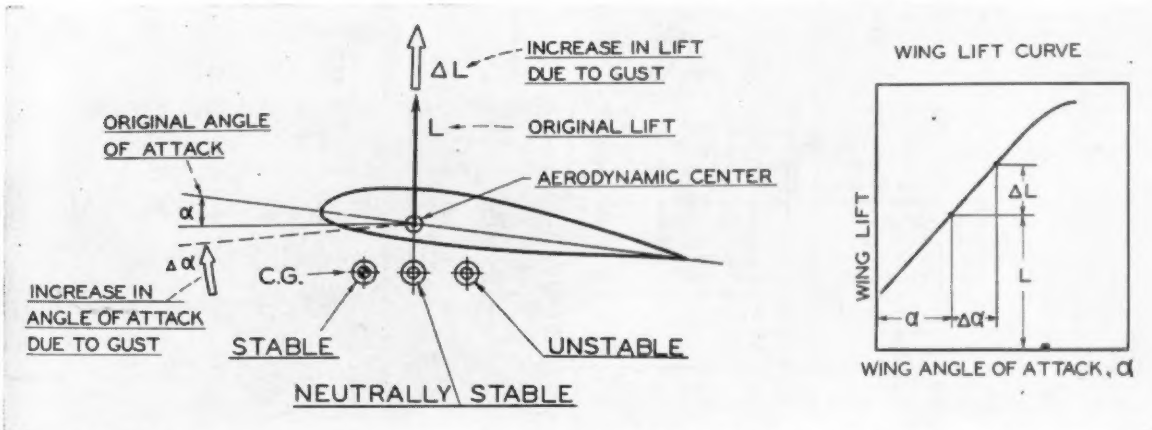


Fig. 4 In considering the stability of a flying-wing, the C.G. must be forward of the point of application of the additional lift caused by a gust—that is, C.G. must be forward of the aerodynamic center. If the C.G. is exactly on this center, the plane has "neutral" stability

many of which purposely have very little in order to be highly maneuverable and easily controlled.

But even though the importance of stability in a model is immediately recognized, it is sometimes confused with trim and control. A model will not fly *properly* unless it is trimmed —but it will not fly *at all* if it is unstable. It is impossible to trim an unstable model. However, the zooming or diving of a model that is out of trim should not be confused with the fatal swoop of a model that is unstable. "Trim" concerns the forces acting on a model *to balance* it in steady flight—where the thrust equals the drag, the wing lift and the tail force equals the weight, and the pitching-moment, about the C.G. is zero. Erratic flights can result if these forces are not in balance and the model tries to find a state of trim, but this, strictly speaking, is not instability.

What is stability? What are the simple facts of the stability of a body moving through the air? Perhaps we can see what they are by a simple experiment.

If we throw a plain stick of wood through the air, we notice that nine times out of ten it will swish around in a series of rapid revolutions depending almost entirely on how we happen to throw it. However, there are two consistent features of all these "flights." If we were first to determine its *center-of-gravity* (the center of side area in this case), paint a black dot on it to represent the C.G., and then take motion pictures of it swishing through the air, we would see that, regardless of how rapidly it rotated, the black dot (which is the C.G.) always travelled along a reasonably smooth flight path and that the rest of the stick rotated about the C.G. This is the basic idea of the "flight path" then, and demonstrates that a body rotates about its C.G. when moving freely through space (Fig. 1a). This fact allows the model builder to consider a model airplane in flight as actually being stationary—or in other words, "static." We can, if we wish, visualize a nail or a pin driven through its C.G. as a mechanical point of rotation. We can then more conveniently discuss the various stabilizing and trim forces which act on it and which tend to rotate it about this pivot point.

The bare stick wasn't stable. It continued to rotate in a haphazard manner after it was thrown and didn't align itself along its flight path. However, it can be made stable. Suppose we attach a weight to one end—that is, we make a spear out of it. If we throw it now, we find that the heavy end will travel first and there will be no rotation (Fig. 1b). It will be stable and will point along its flight path. If we wish to make it even more stable, we can add lightweight fins to the tail—perhaps in the form of feathers—and we now have an arrow of very great stability and accuracy (Fig. 1c). We can conclude then that the bare stick wasn't stable because its C.G. was at the same point as its center of side area—that is, its *center-of-pressure* (C.P.), or *center of resistance*, and that consequently it wobbled through the air since there was no stabilizing moment about the C.G. The spear *was* stable because we moved the C.G. forward of the C.P. by attaching the spearhead to the front and in doing so obtained a restoring moment about the C.G. We then further increased its stability by adding fins—or a tail, and moved the center of pressure still further back from the C.G. That is, we lengthened the moment arm of the restoring force. We see then that we can either obtain or increase stability in two ways, (1) by moving the C.G. forward or, (2) by moving back the point where the stabilizing force acts, or in general, by increasing the moment arm of the restoring force.

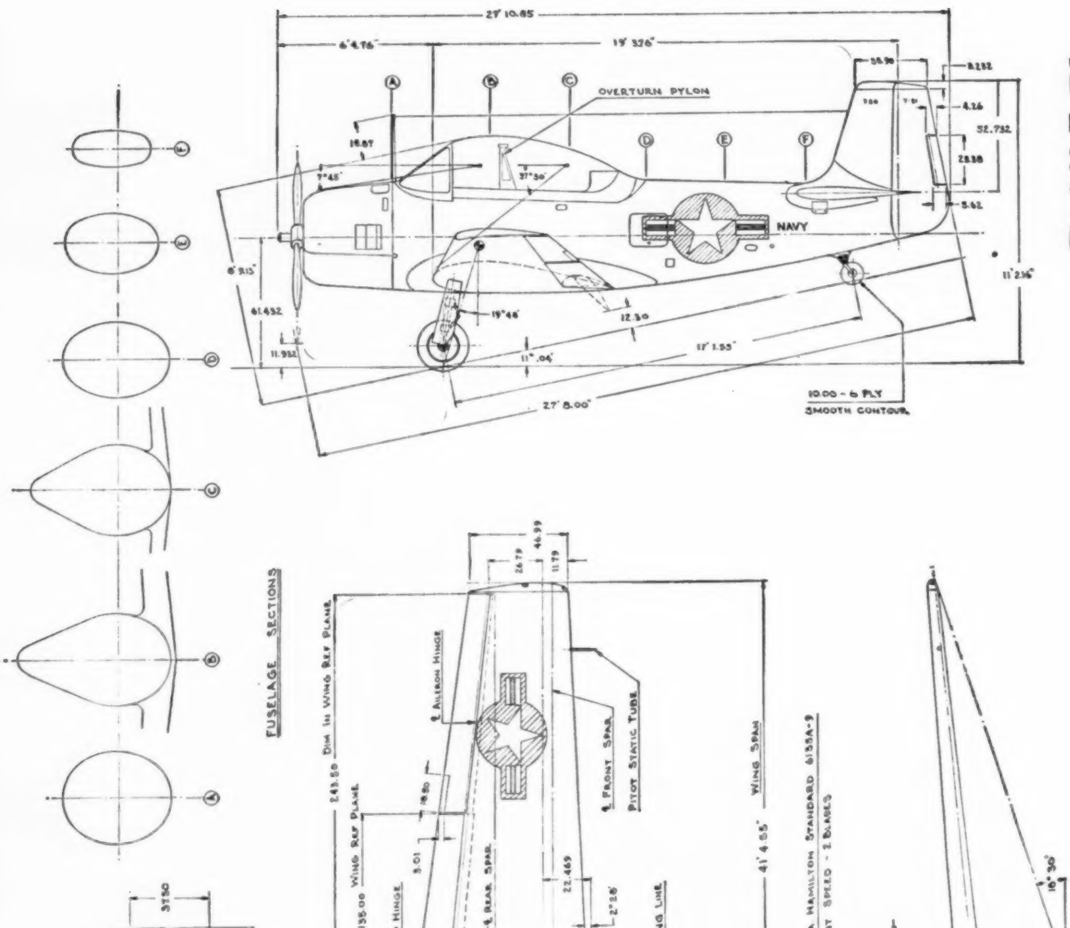
In speaking of big airplanes and airplane models, the point where the net resisting force acts (the *center-of-pressure* of the entire model) has been recognized as a basic reference point of longitudinal stability and is called the *neutral point*, or point of neutral stability, since if the C.G. were located here (as it was on the bare stick) the stability would be zero or neutral. The actual degree of stability then, is said to depend directly on the length of the restoring moment arm, or the distance from the C.G. to the neutral point and is called the *static-margin*.

It has been found by the N.A.C.A. from observing a great number of model airplanes in flight that the *static-margin* is a universal index of stability and that when it is less than 5% of the mean aerodynamic chord (MAC) the stability will be poor; when between 5% and 10% it is fair; and when over 10% it will be good. *Static-margins* of about 15% consistently gave excellent stability and steadiness in flight. We have them, as a physical picture of the stability of a model airplane, the behaviour of a simple weather-vane (Fig. 2). In thinking of directional stability, we have always thought of the vertical tail as acting as a weather-vane and it is simple to do so since the tail is the only vertical surface involved. We can also consider longitudinal stability in the same manner, even though there are two horizontal surfaces—the horizontal tail and the wing. We merely consider their average effect.

(*Turn to page* 62)

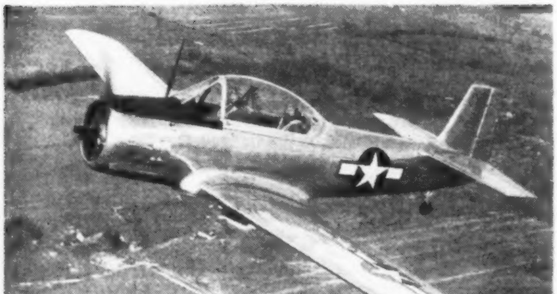
Fairchild T-31

Drawn by: Leonard Wieczorek



Fairchild T-31

by ROBERT McLARREN



THE standard primary trainer of the U.S. Air Force next year will be a Navy-designed airplane; and that's one of the first tangible results of the armed services merger. It is not, by far, the first time the services have interchanged training planes, but always before it was just the other way around—the Navy, for years, has used slightly modified versions of Air Force training planes.

Oddly enough, the nation's first extensive producer of training planes, Consolidated Aircraft Corporation (now Convair), is today the producer of the largest military airplane in the world—the B-36 bomber. Consolidated's first trainer, built in 1923, was not even its own but a revised design developed by the Dayton-Wright Company. This early TW-3 featured side-by-side arrangement of the instructor and student, but this idea was quickly abandoned and the PT-1 resulted from the redesign of the TW-3 into a tandem arrangement. This basic design continued in Air Force service for ten years and the Navy obtained slightly-revised versions of it as the NY trainer.

North American entered the aviation business in 1934 with a trainer design, the NA-16, and this basic design continued through the Air Force BT-9, BT-14, and AT-6 and is still in use. Again the Navy acquired the type as the famed SNJ series, which are also still very much in use, thus the history of the military trainer has always been Navy purchase of basic Air Force airplanes.

After the virtual cessation of training plane procurement by both services in the middle of 1944, both began studies of entirely new training plane designs based on wartime experience. The history of the training plane and its use in service was that its performance must follow the performance of combat aircraft; that is, as one goes up the other must. As fighter plane speeds moved from 200 to 400 mph between 1928 and 1938, so did the top speed of the training plane double, from 100 mph to 200 mph. As service aviation moved into the postwar era of jet fighters, it was necessary that any new trainer type have high performance.

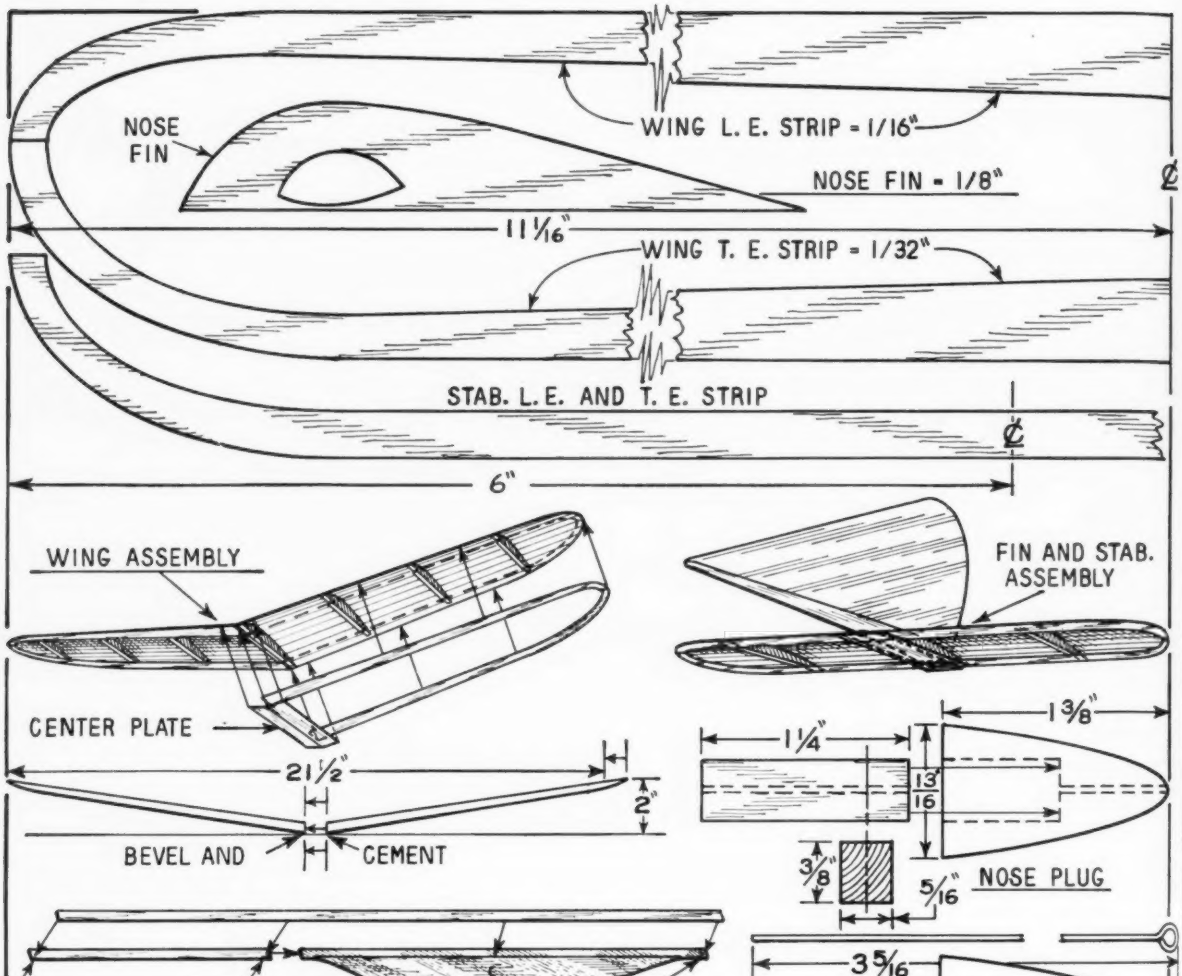
However, this rule can be followed only so far in the training plane field, then other factors begin to take over. In pursuit of this aim, both services abandoned the biplane and the Air Force PT's and Navy "Yellow Perils" were removed from the lists and scrapped. This left both services with the basic trainer as the lowest echelon aircraft in the performance category (the Air Force AT-6 and the Navy SNJ), but at this point the two services came to a parting of the ways.

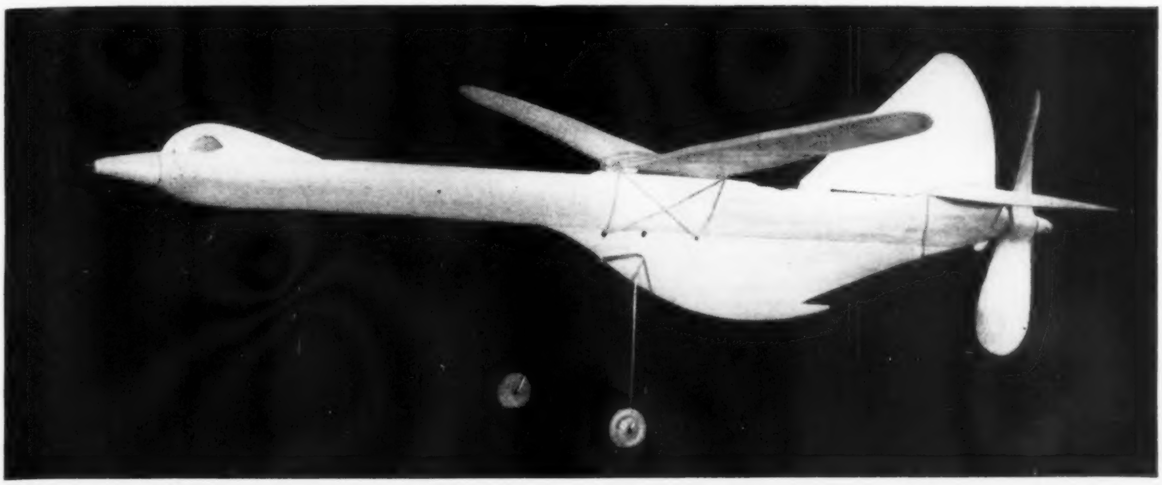
The Air Force decided that the AT-6 could be used effectively as a primary trainer. The Navy decided that a new primary trainer design was needed. It was this divergence of view in 1946 that set in motion the change of events that has now resulted in Air Force procurement of a Navy-designed airplane.

The Air Force examined extensive wartime training records, performed a number of experiments with flight students and, compiling all of these results (learning curve, pilot proficiency, accident rate, cost per training hour, etc.), decided to lay out its training program as follows: the student would receive his first ride and primary training in the AT-6 after which he would be placed directly in the cockpit of a tactical type used as an advanced trainer.

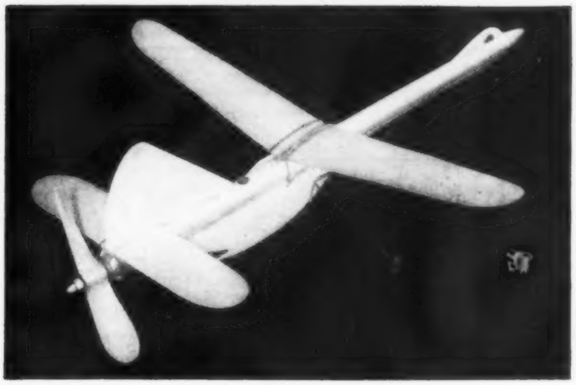
This system was not long in operation before the Air Force changed its mind and abandoned the scheme in favor of a high-performance trainer which would permit the student to progress all the way from his first airplane ride to his graduate

(Continued on page 49)


NOSE FIN
WING L. E. STRIP = 1/16"
NOSE FIN = 1/8"
11 1/16"
WING T. E. STRIP = 1/32"
STAB. L. E. AND T. E. STRIP
6"
WING ASSEMBLY
FIN AND STAB. ASSEMBLY
CENTER PLATE
21 1/2"
2"
BEVEL AND
CEMENT
1 1/4"
13/16
1 3/8"
3/8"
5/16"
NOSE PLUG
3 5/16"
THREE THICKNESSES OF 1/32" SHEET
ASSEMBLY
BLOCKS
FUSELAGE ASSEMBLY
ELEV. BLOCK
5 1/4"
5/8"
FIN RESTRAINING BLOCKS
ELEV. BLOCK
SEC.
C.G.
RUBBER BANDS
LANDING GEAR
1/4 SCALE
FULL SIZE
1"
C.H.G.



GOOSEY GANDER



by CHARLES H. GRANT

THERE are only a few model fliers who realize that rubber-powered models will fly as well and more consistently than gas models. Of course, gas models are more dramatic, they are faster and noisier, but rubber models in their quiet way will do a comparative job of flying. They are also simpler to build and fly, provided the design is correct. Without question they give less trouble and in a given time more flights can be made with them. One reason for fewer rubber model flights is the dearth of well-designed models of this type. A certain amount of experience is necessary to create a design, build it, and win a contest with it. Also contest models are not easy to design. They are usually the product of years of experience and are a real problem for beginners or novices to complete successfully. Then again, the matter of adjusting a model plays a great part in the winning of a contest, especially if there are hidden faults in the design itself. In such cases careful and tricky adjustments are required to obtain flights.

In order to span the gap between simple sport models and contest planes, we offer you *Goosey Gander* as a *prototype contest model*. It embodies the proportions and features of contest models, both in design and construction, yet it is smaller, comparatively simple to build and often turns in contest performance. With 6 strands of 1/8" flat rubber, it climbs steadily and will give flights of 100 seconds. When powered with 8 strands it reaches great altitude and acts like a real contest job. Its construction is unique, light yet sturdy. Its unusual feature is the location of the propeller behind the stabilizer. The fuselage is extended well forward to bring the C.G. forward and to provide a long rubber motor for greater length of flight.

The fin below the fuselage and the long fuselage extending forward of the wing gives the plane the distinctive appearance of a goose in flight. The low fin, or keel, also centers the side area so that little, if any, rotation occurs about the longitudinal axis, even during flights in windy weather. This feature provides unusual steadiness, which in turn results in greater duration because power and altitude are not lost during flight from erratic maneuvers.

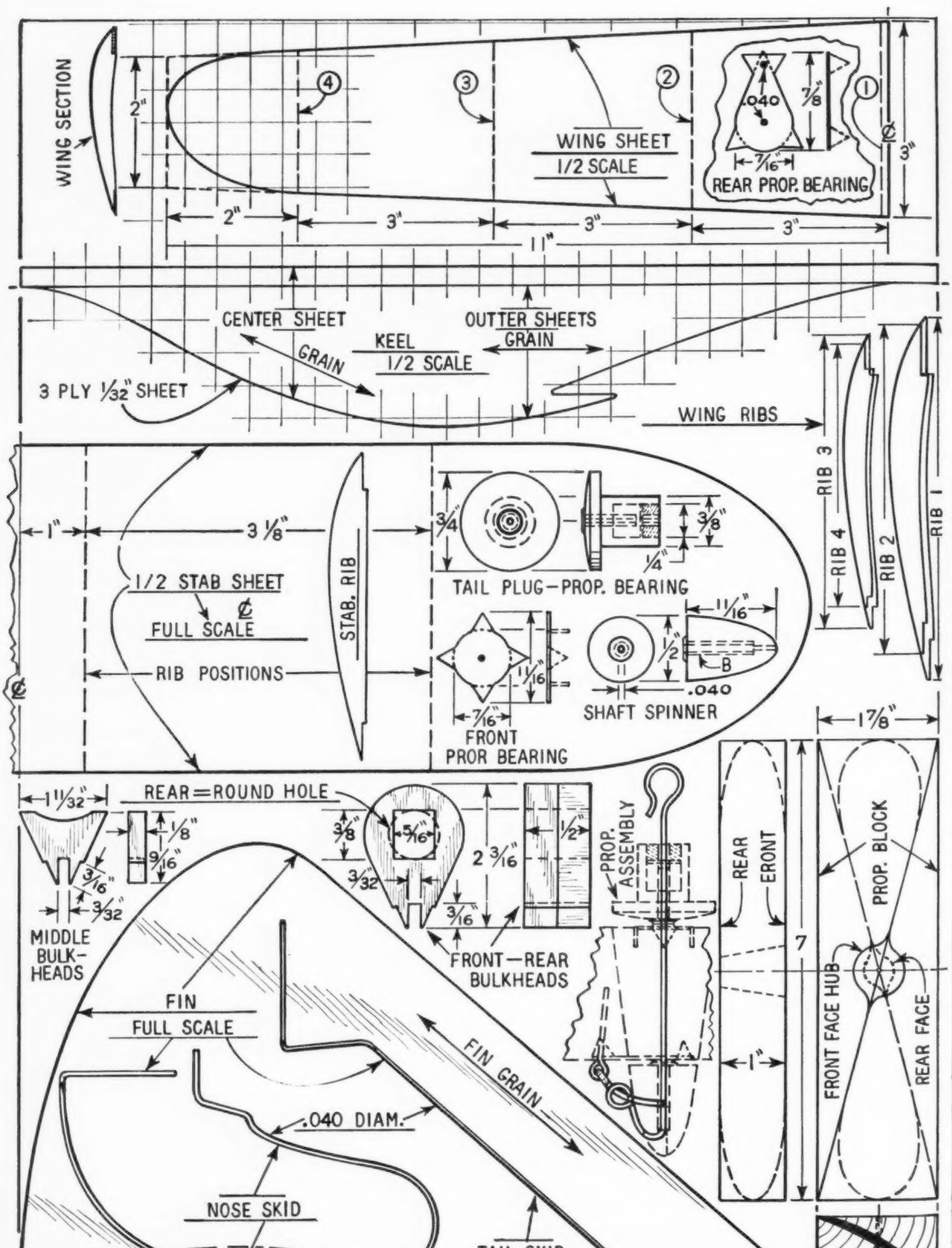
This little plane provides the training that is necessary for you to create a winning contest model. With it you can learn all the tricks of building and flying contest models with less labor and waste of time. Any crack-ups that result will be much more easily repaired. When you are ready to build a full-fledged contest job, all that you have to do is to construct a plane exactly like this prototype but with dimensions just *twice* as large. In other words, build your contest model of this plane, using 1/16" thick balsa in place of 1/32", 1/8" in place of 1/16", etc. The wing area of the contest job will be just short of 200 sq. in. because the area of this wing is about 49 sq. in. The stabilizer area is a little less than 50% of the wing area. Make such a model your next construction job.

CONSTRUCTION. First study all of the plans carefully so that you have a picture of the model and all of its construction details clearly in mind before you begin to build it. Start construction by cutting out the wing sheet from 1/32" balsa to the outline shown on the plan in half size. Best results will be obtained by making a full size cardboard pattern so that the wing outline can be traced easily on the balsa sheet. Also cut out the wing ribs, and the leading and trailing edges of the wing, both of which are shown in full size. Ribs 2, 3, and 4 are cut from 1/8" medium hard balsa (cut rib No. 1 from 1/4" balsa; there will be two of each rib), leading edge strips from 1/16" and trailing edge strips from 1/32" sheet.

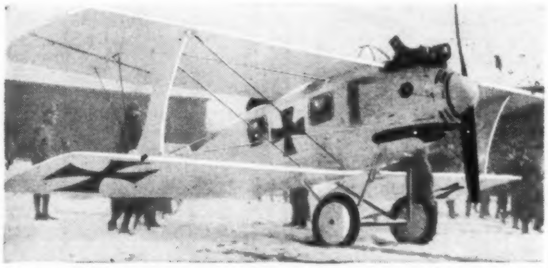
First cut the wing sheet at the center and glue four ribs to each half in the position shown in the plans. Rib No. 1, 1/4" thick, is the center rib and is glued flush with the butt end of the wing sheet where it has been cut. All ribs are glued with their front ends flush with the leading edge of the wing, as indicated in the plans. Hold the ribs in place with pins. A

(*Turn to page* 50)

Unusual design and construction methods combine to make this an exciting project


WING SECTION
2"
4
3
2
1
WING SHEET
1/2 SCALE
.040
7/8"
7/16"
REAR PROP. BEARING
3"
2"
3"
3"
3"
11"
CENTER SHEET
GRAIN
KEEL
1/2 SCALE
OUTTER SHEETS
GRAIN
3 PLY 1/32" SHEET
WING RIBS
RIB 3
RIB 4
RIB 2
RIB 1
1"
3 1/8"
1/2 STAB SHEET
FULL SCALE
STAB. RIB
RIB POSITIONS
3/4
3/8"
1/4"
TAIL PLUG—PROP. BEARING
11/16"
1/2
B
.040
11/16
7/16
FRONT
PROR BEARING
SHAFT SPINNER
1 7/8"
11/32"
1/8"
9/16"
3/16"
3/32"
MIDDLE
BULK-
HEADS
REAR=ROUND HOLE
3/8
5/16"
3/32
2 3/16
1/2"
3/16
FRONT—REAR
BULKHEADS
PROP.
ASSEMBLY
REAR
FRONT
7
1"
PROP. BLOCK
FRONT FACE HUB
REAR FACE
REAR
FIN
FULL SCALE
FIN GRAIN
.040 DIAM.
NOSE SKID
TAIL SKID
FIN BASE STRIPS
C.H.G.

Note beautiful lines and careful streamlining of this Roland C. II. Single I struts were used



Deep "whale" body was accentuated by painted mouth and eyes

WORLD WAR I

by ROBERT C. HARE

ROBERT C. HARE

BOB HARE began modeling in 1926, in the days of basswood, rattan and hot glue. He specialized in exhibition speed jobs and indoor endurance types, won many contest events in the early 1930's. His intimacy with W.W.I types was gained through actually working on them for movie purposes and through collecting data. Besides being a contributor of model and full size aviation articles to M. A. N. since 1933, Hare is a recognized aviation authority and author. During the war he was associated with Lockheed and North American in planning and in public relations. His present activities in the latter field provide little time for all-out modeling, but he manages to build a job or two now and then just to keep a hand in.

PART ONE

WHEREAS the science of horticulture may not appear to have anything in common with aviation, there is a distinct parallel—every once in a while both sciences produce a strain or a plane that stands far and above the average. This was particularly true of aviation, where scientists seemed to have better control over their experiments than did their plant-growing contemporaries.

Many such aviation standouts have been discussed in these pages of information on World War I aircraft. Every so often a W.W.I designer apparently would throw caution to the winds, turn his back on what had been a successful formula, and go hog-wild on theory. Then the lessons learned from the highly advanced product would be incorporated in planes designed according to known facts, and there would be the real progress, in terms of utility of applied theory.

Our plane for discussion this month is one of those types that made the critics shake their heads and made Allied pilots who met it bug-eyed with wonder. The plane itself, the L.F.G. (Roland) C.II, was frankly not so hot, but it was an advance in theory on which its designer, Roland, staked his reputation successfully because it seemed to shake the rock-bound conservative German designers off their lofty perches of efficient but run-of-the-mill designs.

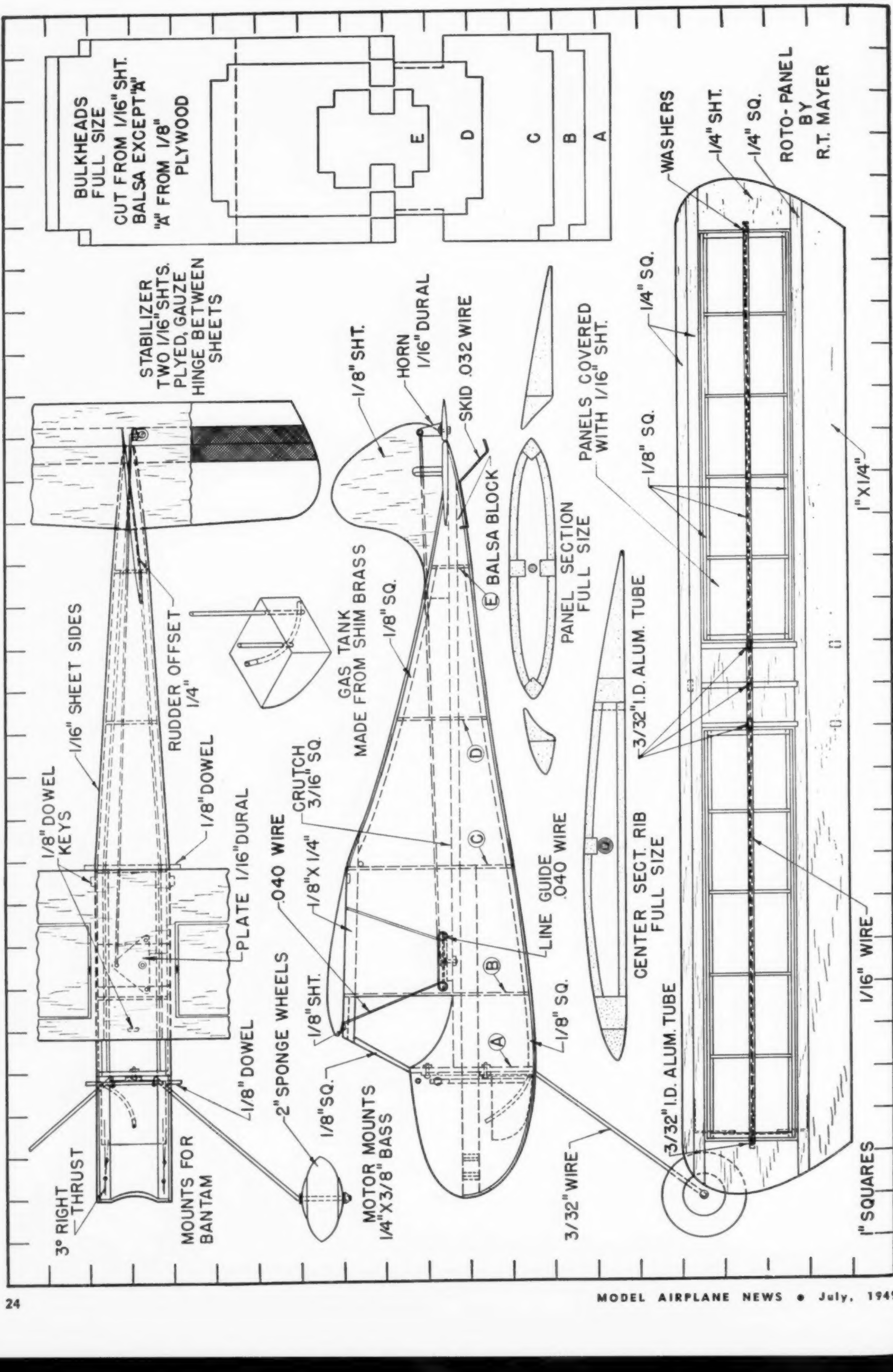
Roland was the chief engineer and designer of Luft Fahrzeug Gesellschaft, a German aviation company that had its beginning in 1906 as the "Motorlufschiff Studiengesellschaft", an experimental lighter-than-air craft firm which a year later built Parseval airships. A little later still this firm got out of the balloon business when it obtained rights to manufacture the Wright Brothers' types in Germany, and changed its name to "Flugmaschinen Wright Gesellschaft." In 1912, the latter firm was dissolved, and L.F.G., with engineer Roland in charge of design, was formed with factories at Charlottenburg (aircraft), Bitterfield (sea planes and dirigibles), and at Stalsund (sea planes), on the North Sea. The firm also maintained a huge hangar and maintenance shop at Reinikendorf, near Berlin, where its land-going products were shipped for flight testing and delivery.

Roland must have had the design of the L.F.G.C.II in the back of his mind for a long time. He designed and built, in 1312 and 1913, a flexible winged monoplane and biplane, the latter made of steel framework. Both ships were improvements over anything of their period, but the use of steel at that time was purely theoretical and seemed to indicate that something else with stirring in engineer Roland's inventive mind.

When World War I began, L.F.G. had no suitable military type for production, and so was assigned the job of subcontractor. The plane assigned to them was the Albatros C.I, very efficient, but at the same time a very conventional design. Apparently this irked Roland somewhat, because it wasn't long before officials of the German Air Service were invited to Charlottenburg to see an unusual new type of airplane.

What they saw literally made them gasp. There had never been anything like it before. To this group of dignitaries who had become accustomed to a maze of wires, struts, and square corners as an indication of strength and reliability, the plane Roland showed them just could not be. Perhaps for 1917 or 1918—they could appreciate that progress would be made—but not for 1915!

(*Turn to page 54*)


BULKHEADS FULL SIZE
CUT FROM 1/16" SHT. BALSA EXCEPT "A"
"A" FROM 1/8" PLYWOOD
E
D
C
B
A
STABILIZER TWO 1/16" SHTS. PLYED, GAUZE HINGE BETWEEN SHEETS
1/8" SHT.
HORN 1/16" DURAL
SKID .032 WIRE
E BALSA BLOCK
PANEL SECTION FULL SIZE
PANELS COVERED WITH 1/16" SHT.
1/8" SQ.
1/4" SQ.
WASHERS
1/4" SHT.
1/4" SQ.
ROTO-PANEL BY R.T. MAYER
1" X 1/4"
RUDDER OFFSET 1/4"
1/16" SHEET SIDES
GAS TANK MADE FROM SHIM BRASS
1/8" SQ.
D
1/8" DOWEL KEYS
1/8" DOWEL
1/8" DURAL
PLATE 1/16" DURAL
CRUTCH 3/16" SQ.
C
.040 WIRE
1/8" X 1/4"
LINE GUIDE .040 WIRE
B
CENTER SECT. RIB FULL SIZE
3/32" I.D. ALUM. TUBE
1/8" DOWEL
2" SPONGE WHEELS
1/8" SHT.
1/8" SQ.
A
1/8" SQ.
3° RIGHT THRUST
MOUNTS FOR BANTAM
MOTOR MOUNTS 1/4" X 3/8" BASS
3/32" WIRE
3/32" I.D. ALUM. TUBE
1/16" WIRE
1" SQUARES

FLUTTER WING

by ROLAND T. MAYER

Here is an interesting experimental design that seems to have great possibilities in the stunt field

PERHAPS the name *Roto-panel* most accurately describes the plane featured in this article, or at least the method of generating lift used with this plane, but from its very conception it has been called a *Flutter Wing* for some reason or other, and at this stage of the game everyone who has ever seen it fly will undoubtedly remember it as such.

As far as is known the ship has no prototype in either full scale or model aircraft at present, but after putting the *Flutter Wing* through its paces, we are sure that before long planes of this type will be popular performers in any stunt event.

The plane presented here is the final result of a year and a half of experimental work with rotary panel types, beginning with hand-launched and towline gliders and working finally into controline gas models. Our main purpose in beginning this project was to develop a wing for stunt models which could produce a relatively constant amount of lift throughout various maneuvers, thus preventing the lag and general sluggishness usually present in most stunts performed by U-control models. Wing slots have been employed by many builders to increase the anti-stall characteristics of their ships with varying degrees of success, but even these models on the average seem to lack smoothness. Judging from performance we believe the rotating panel goes a step beyond the best that slots have to offer.

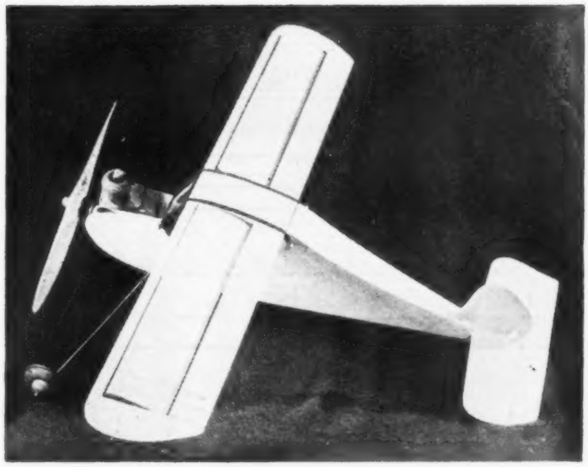
Perhaps the theory behind the rotating panel can be most easily explained by the use of an analogy. Let us compare the panel to a falling leaf which as it falls rotates about an axis parallel to the ground and running the length of the leaf. The rotation is such that the leading edge moves upward while the trailing edge moves downward. Now by enclosing this symmetrically shaped panel between a leading and trailing edge, so shaped as to channel the air flow in a manner which would cause the panel to rotate at a higher speed and in an opposite direction to the leaf previously mentioned, a lift was produced which proved sufficient to maintain a plane in flight. In addition, this lift was found to remain relatively constant throughout various maneuvers. This may be explained by the fact that regardless of the angle of attack of the wing, the attitude of the rotating panel with respect to the air stream remained virtually unchanged.

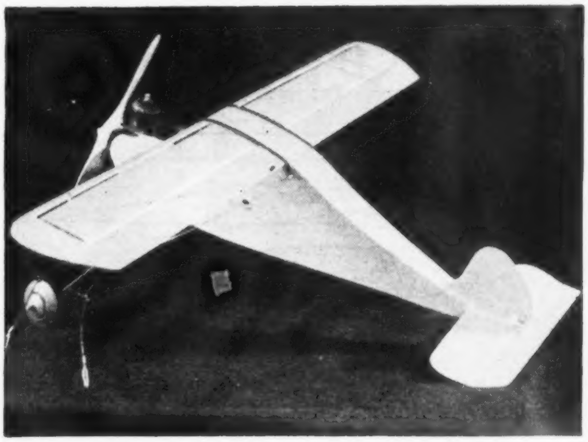
The advantages of the rotating panel wing over the conventional type may be summed up as follows: because of the added drag of the panel, its initial lift-drag ratio is lower than that of a regular wing and a plane employing it will necessarily be slower, but the lift delivered remains relatively constant throughout all changes in the angle of attack. Although the conventional wing has a high lift drag ratio at its best angle of attack, this ratio fluctuates rapidly from its maximum to a value of zero as the angle increases. At the zero point no lift is produced, but the drag is very high. Naturally, in stunt flying this very unfavorable zero point is reached quite frequently and with the complete loss of lift comes the corresponding instability and loss of smoothness in performance. We feel, therefore, that any wing capable of delivering a fairly constant amount of lift throughout a wide range of changes in the angle of attack, as does the *Flutter Wing*, should prove itself hard to beat in stunt competition.

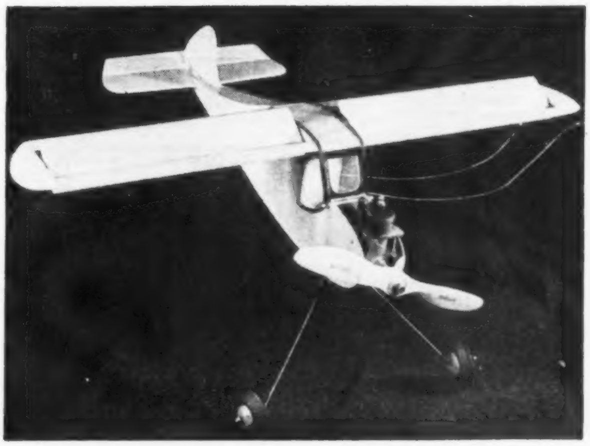
To any experienced builder it will be obvious that the plane presented in this article was not designed for stunting. We were more interested in having a good sturdy carrier for the wing during the initial tests. The prime requisites were strength, ease of construction, and to satisfy our model builders pride, fairly clean lines. When finished, the ship filled the bill nicely.

The initial flight tests were rather hectic but they did give a good indication of things to come. Due to a short elevator horn, the ship was overly sensitive on the first flights. In fact, we had all we could do to keep it on a level flight path; certainly most other ships would never have survived such a violent beginning. Several times because of the oversensitive controls the ship was thrown into violent stalls but it was in these stalls that the *Flutter Wing* showed promise. Instead of falling off and wrapping up in its own lines, as happens in most cases of this type, our ship merely hovered like a helicopter

(*Turn to page 39*)







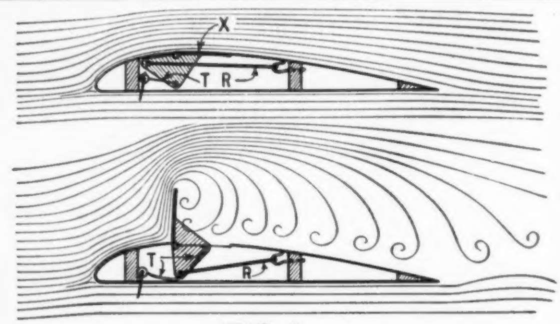


FIG. 1

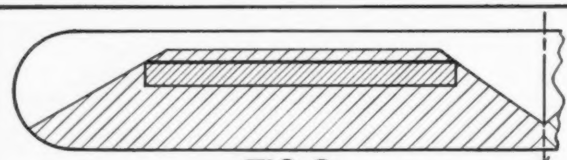


FIG. 2

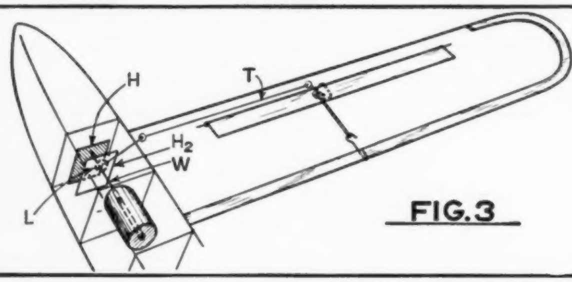


FIG. 3

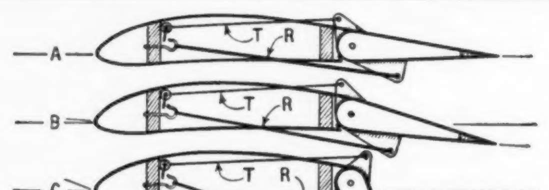


FIG. 4

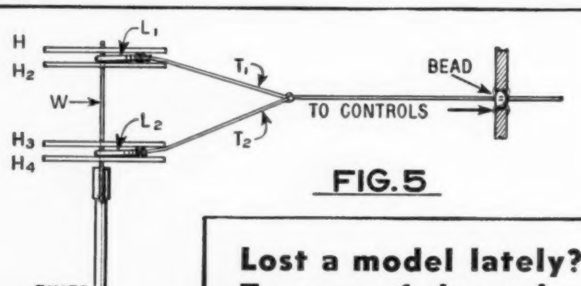


FIG. 5

Lost a model lately? Try one of these dethermalizers on your next free flight job

design forum

by CHARLES H. GRANT

SINCE the pioneer days of 1908, the burning ambition of all model fliers has been to get models up as high as possible and keep them there. That is, it was their ambition until gas engines became so powerful and structures became so light that model planes emulated the helicopter and climbed to invisible heights. Such fantastic climb was achieved by propeller thrust lifting the model skyward rather than by the lift and efficiency of the wings. As more model builders became expert in creating this type of model, more and more planes flew out of sight never to be seen again. Apparently the reward for being an expert was the loss of an airplane. In fact many contests were won by mediocre fliers and planes, merely because they remained aloft in sight of the timers for a sufficient period to place among the winners. Other planes with greater duration disappeared from view in a shorter time, yet obviously remained in flight for much longer periods while out of sight.

Consequently, a contest ceased to be a test of virtue in model design and construction; instead, contests became more and more events of chance. They were excellent sporting events but ceased to be an accurate measure of scientific achievement. This state of affairs encouraged controline flying to no little degree. Advocates of this latter sport argue that broad and expansive flying fields are not necessary and flights can be made under direct control of the operator without loss of planes. Others more wedded to free flight, and who are more inclined to face the greater aerodynamic problems without making excuses about flying fields, have sought means of keeping free flight models within the limits of their vision.

In contests the maximum official flight time is 10 min. Flights of longer duration are credited as only 10 min. This rule was imposed in order to encourage model fliers to keep their flight below this time. This rule, of course, assumes that it is within the power and ability of model builders to restrain their models. With the ordinary model plane, this is obviously ridiculous; once it is up, it is on its own and may fly out of sight regardless of the desire of its operator.

Some other factor is required that will enable the operator to remotely control the plane, and to bring it back to earth quickly after a 10-minute flight. Such action is possible with radio control but this is complicated and impractical.

Thoughtful model builders have devised other means which create *great drag* after a given flight time. This reduces the model speed and buoyancy, causing it to sink rapidly. Even in spite of this handicap models have flown out of sight when they have contacted strong thermals or up-currents. However, when properly applied, air brakes in one form or another will do a commendable job of bringing a model down at a specified time.

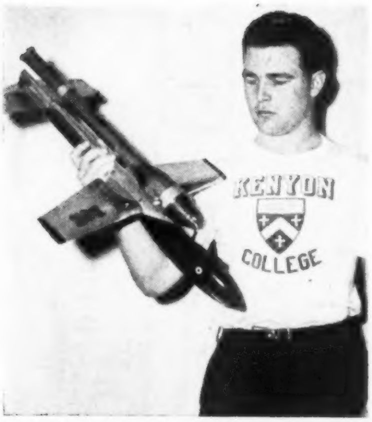
Merely slowing a model down does not always serve this purpose. The plane must also be induced to seek and hold a diving attitude. This reduces the effect of upward currents to a maximum degree. Several modelers have discovered that parachutes attached to the stabilizer, which shoot out from enclosures in the fuselage at a specified time, operate very satisfactorily. In such cases the installation of an extra timer is necessary. This is set to release the parachute after a 10-minute period. The drag of the parachute, attached to the rear of the fuselage, pulls up the tail allowing the nose to drop and the airplane to assume a diving position. The whole combination then sinks rapidly to the ground.

There are other effective methods which might be used if preferred. Mr. Richard E. White of 1410 East Market Street, York, Pa., is inquisitive concerning the effect of spoilers. We believe he is on the right track in this respect and spoilers on the wings appear to operate more satisfactorily than stabilizer dethermalizers. Spoilers on the stabilizer create a drag it is true, but also reduce the stabilizer effect, allowing the plane to nose upward and the wing to become even more effective. The airplane then does not assume a diving position, and remains susceptible to thermals. When spoilers are properly located on the wing, however, they reduce the lifting effect of the wing almost completely. This causes the nose to drop sharply and the

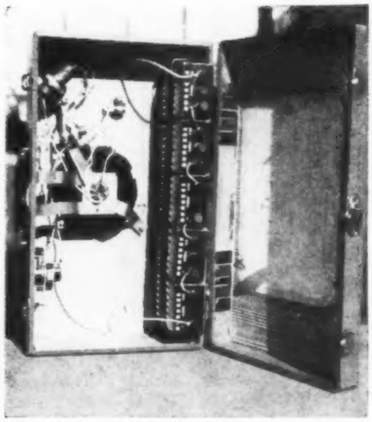
(*Continued on page* 43)

AIR WAYS

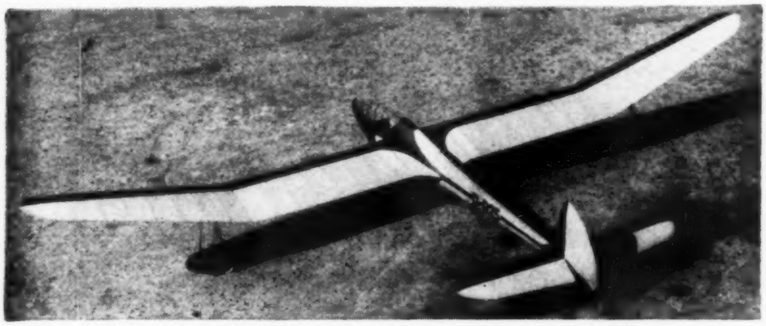
News of Model Airplane Experimenters All Over the World



No. 1 Russ Dunham shows his latest jet speedster

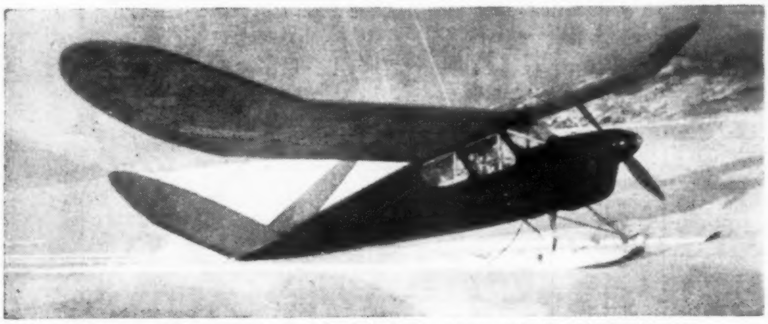


No. 2 Portable stroboscope by Ralph Jones

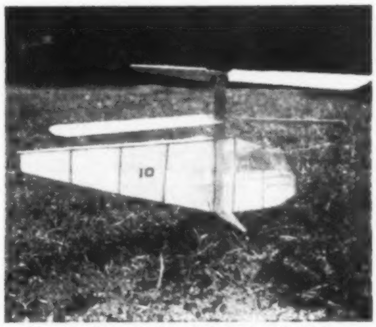


No. 3 A beautiful soaring glider model built by Alfred Richter in Germany

No. 4 Corbett K. Bates built exceptional S.E.-5a



No. 5 Something unusual—a radio controlled model on skiis. Eut Tileston flies it



No. 6 Bruce Anderson likes his *Hoverbug*

AS OUR READERS have probably been convinced by now, this July issue marks 20 years of continuous service to modelers by M. A. N. Events of the past are recorded on other pages: what will the future of modeling bring? In a field as diversified as model aviation, it is almost impossible to say, but a few trends may be noted. We sense a growing interest in what are usually termed "Sport Contests." In controline these events take the form of Team Racing, 100 Lap Races, and the like; most of these new forms of competition were dreamed up and brought to popularity by dyed-in-the-wool speed fliers, who haven't forsaken their scientific quest for more and more speed, but we suspect they wanted to get a little more pure fun out of model flying.

In the free flight gas category, the "Sport Contests" have developed along the lines of spot landing events, weight lifting, and precision flying—where a model must take off, fly a specified pattern, and land in a specified place. Here again, we find that the really experienced fliers are among the strongest supporters and seem to get the biggest kick out of such proceedings.

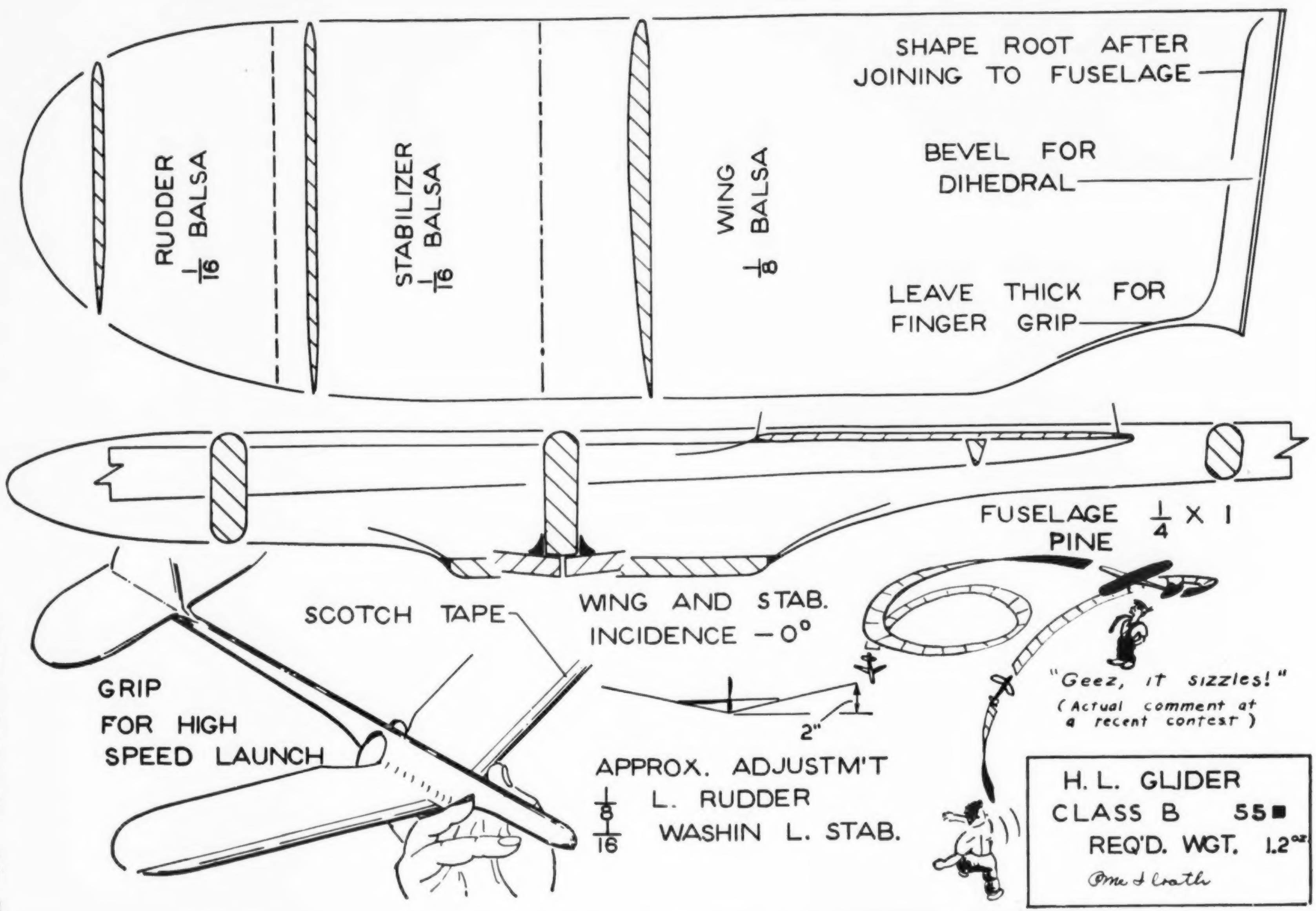
Qualified observers all over the country report an unprecedented interest in radio control and an interest moreover which goes beyond just *reading* about R. C.; there are more R. C. planes now actually *flying* than ever before.

Now it seems quite a coincidence (or is it?!) that the sport type of event, either controline or free flight, and radio control flying as well, are lots more fun for the nonflying bystanders. This is surely all to the good, for from the ranks of these bystanders come many of our future model builders. It's easy to see why. The non-modeler can't appreciate the problems involved in pure speed flying (most of the time the ships go so fast he can't even *see* them) but he can laugh along with the participants in a hotly-contested Team Race. Similarly, ordinary duration free flight means only a screaming climb and then—out of sight, to the casual onlooker. But it's real fun for him to see a model ROG, turn two right and two left circles, and land at the starting point—all within plain view.

We don't expect pure speed or pure duration to die out—far from it. But let's have *more* fun in our flying; and let's share this fun with all these prospective modelers.

Another discernable trend seems to be toward smaller, more easily built and handled models. This is easy to judge from the popularity of CO2 power plants, and now from the rapidly growing interest in the new midget class of gas engines. Anyone who has built a Class D giant, carried to the field on a

(*Continued on page* 45)


SHAPE ROOT AFTER JOINING TO FUSELAGE
BEVEL FOR DIHEDRAL
LEAVE THICK FOR FINGER GRIP
RUDDER 1/16 BALSA
STABILIZER 1/16 BALSA
WING 1/8 BALSA
FUSELAGE 1/4 X 1 PINE
WING AND STAB. INCIDENCE — 0°
SCOTCH TAPE
GRIP FOR HIGH SPEED LAUNCH
2"
APPROX. ADJUSTM'T
1/8 L. RUDDER
1/16 WASHIN L. STAB.
"Geez, it sizzles!"
(Actual comment at a recent contest)
H. L. GLIDER
CLASS B 55■
REQ'D. WGT. 1.2 oz

LOW BROW

by PAUL McILRATH

Get your—ah—heart into the launch . . .

But be sure you have welded those wings on!

THIS hand-launched glider features a low wing and high climb. If you have an arm like Bob Feller's, turn the page. But if the batter has time to wave to his girl in the upper deck while he's waiting on your "Fast One," here's a glider *you* can fly.

A very ordinary throw will knife the *Low Brow* up into real thermal country. In sunset air, the floater-type ship will turn in flights a few seconds longer, but for thermal snooping, we'll take a *Low Brow* every time. We favor a low wing for several reasons. Most important: it forces a builder to learn to use an efficient grip for launching. There's only one way you can hang on to this ship.

Though construction is not unusual, it must be especially rugged. Wing stock should be medium hard balsa and the fuselage flexible, straight-grained pine. The dihedral joint and the wing-to-fuselage joint must fit exactly. Don't be satisfied with just squeezing cement into the cracks. A sloppy joint simply won't stand up under the abuse it will receive.

Blend the fuselage lines carefully just behind the wing and just in front of the tail. Flex the tail boom occasionally while it is being shaped to be sure that no weak spots develop.

Unless you're the eager type, a super finish is more trouble than its worth. Anything that will keep the surfaces flexible and waterproof is O.K. We've used glider polish, dope and castor oil, floor wax, and even shoe polish.

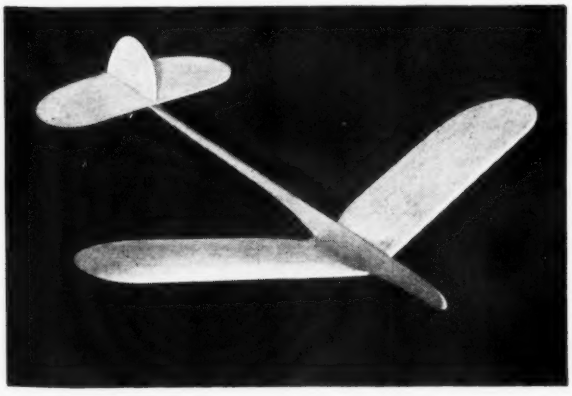
Careful adjustment is the all-important thing in glider flying. The guy with the old adjustment know-how can get good flights out of a flat rock. The trick—executing the roll from the right bank of the launch to the left bank of the glide so that there is no trace of a stall. Even a slight stall wastes most of your precious altitude.

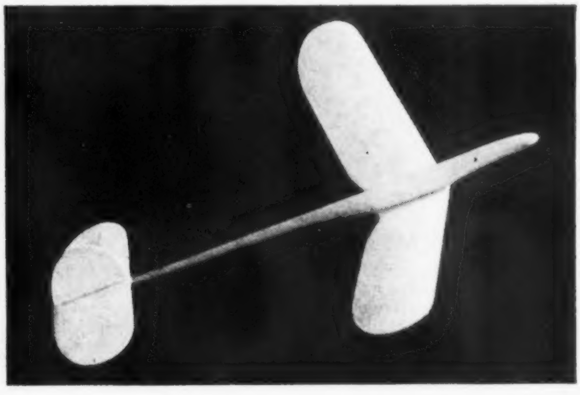
Briefly, here is standard adjustment procedure:

1. Balance the ship at the finger grip. If the nose is too light, add a little clay; if heavy, whittle away a little wood.
2. Trim with rudder and stabilizer until shoulder height glides are smooth with a left turn.
3. Toss easily a few times with the same motion that you would use if you were playing catch. The plane should climb 20 or 30'. With this additional height, check the glide a little closer and tighten the circle in the glide as much as you can. Remove weight from the nose if a spiral dive results.
4. When the glide and turn suit you, start leaning into the launch a little more. Pitch the ship just as if it were a baseball. If it recovers too soon, resulting in a loop or a stall, use a more side-arm motion. If it holds the right bank too long and doesn't gain any altitude, throw with a more overhead swing.

Low Brow isn't touchy as far as slight design changes are concerned. Versions have been flown successfully with more and less dihedral, longer and shorter tail moment arms, more and less tail area, and thicker and thinner wings. They have been adjusted to climb in any pattern from a tight right spiral to a straight ahead Immelmann. Though we don't recommend it, our own *Low Brows* climbed nicely while in a left slow roll.

In two years of flying, none of the ships have ever dived into the ground due to excessive right bank in the launch. They can be pitched in a right vertical even when the wind is from the left. In the glide, a circle of 40' diameter can be held without a spin-in.





AS { A WIFE SEES IT

by GRACE STOLOFF

...sits in the cellar all day and night finishing his plane

Frankfurters and beans along with the latest model magazine

YOU'VE heard of black spider widows, merry widows and grass widows, but did you ever hear of a model airplane widow? Well, that is the category into which I have fallen. Model airplane widows are by far the worst of all, because the condition is seasonal. You have a husband through October to March. The rest of the months, you think you are married to a piece of balsa wood. There is balsa dust in your hair, on your floors and in your food. However, you are very fortunate if this is the case, because it means your husband is building someplace in your apartment. Whenever you become doubtful, you can catch glimpses of whatever part of his anatomy faces you, and reassure yourself you really do have a husband. The unlucky wives, like myself, live in a house with a cellar. Then, your husband moves in with the mice, and hibernates for the season.

Model building is actually a year-round hobby, but the season I refer to is the period of time when the contests take place. He may still go to work and eat his meals but he does that like an automaton. That is only a necessary evil he must put up with. Many a model airplane builder has been known to quit work during this season and live on unemployment insurance for the interim. This is much to the envy of the married men who at this time of year wonder why they ever got married.

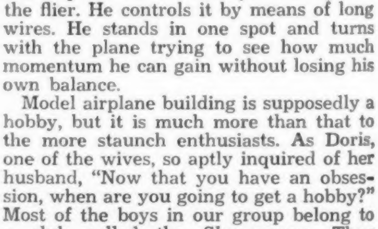
You do get to see your husband at dinner time, but if you yourself did not greet him at the door, it could be the man next door sitting opposite you for all you know. His head is immersed in the current model airplane magazine. There is one advantage to this. You can save money on your groceries if you are smart. Since he does not know what he is eating and seems to care less, I take advantage of this by spending a pleasant shopless, cookless day. Then five minutes before my husband, Jerry, is due home, I put the frankfurters on to boil and open up a can of beans. I taught my husband to be appreciative and he always says when he's through, "Mmm, delicious."

Now the evening is yours. Somewhere around eleven or twelve o'clock, the man leaves everything the way it is and goes to bed. When I say everything the way it is, that's exactly what I mean. And you dare not move or touch anything until the plane is completed. This process may take two days or two weeks, depending on what is being built. The most common in our house is free flight. This is where, once you get your motor started and the timer set, the plane takes off of its own accord. The flier then prays for a thermal; when the ship finally does catch one and goes way up, the flier prays for it to come down.

Another design, currently enjoying popularity is the U-control model. This is the ship that makes everyone dizzy but the flier. He controls it by means of long wires. He stands in one spot and turns with the plane trying to see how much momentum he can gain without losing his own balance.

Model airplane building is supposedly a hobby, but it is much more than that to the more staunch enthusiasts. As Doris, one of the wives, so aptly inquired of her husband, "Now that you have an obsession, when are you going to get a hobby?" Most of the boys in our group belong to a club called the *Skyscrapers*. They formed this about ten years ago, and whereas they have gone through various jobs, through the Second World War (and the more private war called "the state

(*Turn to page* 42)



"There it goes—behind that cloud!"

by BILL WINTER and WALT SCHRODER...

WEE BIPE

COMBINING all the appeal of the old Curtiss biplane racers and the ever-popular Knight *Twister* with the larger "baby" engines—particularly the O.K. *Cub* at .049, the *Wee Bipe* is a sturdy, all-balsa semi-scale design for sport flying. Span is 12"; weight, with four coats of red dope, 4 oz. Without paint, the *Wee Bipe* will come in at about 3.3 oz. In our opinion, even this low weight is a rather borderline affair for the *Infant*, though careful construction might hold the weight down to a reasonable 3 oz. At the upper end of the power plant range, the *Arden .099* should give a very lively airplane.

While the *Cub* used in the *Wee Bipe* weighs approximately the same as the *Spitfire* which has practically the same displacement, any such wide variations as the *Infant* and *Arden .099* will require relocation of the bellcrank. A homemade wedge tank, a Darwin *Pee-Wee* stunt tank, or any other small wedge type (such as *Rite-Pitch*) is suggested. Flight path is counterclockwise on .004 wire, 15 to 20' long.

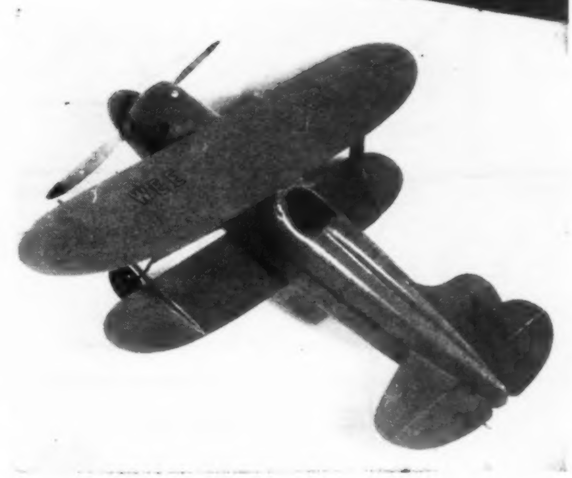
FUSELAGE. Obtain two soft prop blank blocks 12" long; one should measure 1-1/4 inches square, the other 1-1/4" x 1-3/8". Tack-glue these blocks together, that odd 1-3/8" being the height of the top block. Make a template or pattern from light cardboard for the top view outline of the fuselage, and a second template for the side view. Now outline the top view on the temporarily glued-up block and cut out with a coping saw, leaving about 1/16" surplus wood outside the line for sanding. Pin back in place the two pieces of block that fell away when the top view was sawed to outline, then lay the side-view pattern in place, mark out, and again cut away the surplus wood.

Make cross section templates and shape the semi-carved block to its final outside dimensions and shape, sanding first with coarse then with fine paper. Separate the two blocks that made up the fuselage and hollow out with wood chisels, until a 3/32" wall thickness remains. Cut out the various holes and slots for the wings, the landing gear attachment, the cockpit, and the elevators. Mount the fuel tank with its narrow edge to the outside of the circle and its fuel line at the same elevation as the needle valve. Put in the 1/8" x 1/2" balsa bellcrank support. After the complete control system and stabilizer and elevators (see below) have been fastened in place, permanently glue the top block to the lower block. Cut out the 1/32" ply firewall (see section B) and cement it in position. Its exact outline depends on how you hollowed the fuselage; note that the portion of the firewall lying above the joint line of the blocks is flush with the outside of the airplane, but that the lower portion fits within the fuselage. The engine mounts radially by means of 2-56 machine screws, the nuts being attached to the back face of the firewall with several light coats of cement.

TAIL SURFACES. Both stab and elevator are cut to profile from 1/32" sheet balsa. The elevators actually are one piece, with the center or joining portion running through the hole cut in the fuselage. There are two hinges made from .008 shim brass and .014 music wire. After making the hinge, press the brass portion into the stab, and the wire ends into the elevators, gluing lightly. The stab fits into a notch cut in the upper block. The 1/32" sheet rudder glues to the top of the fuselage.

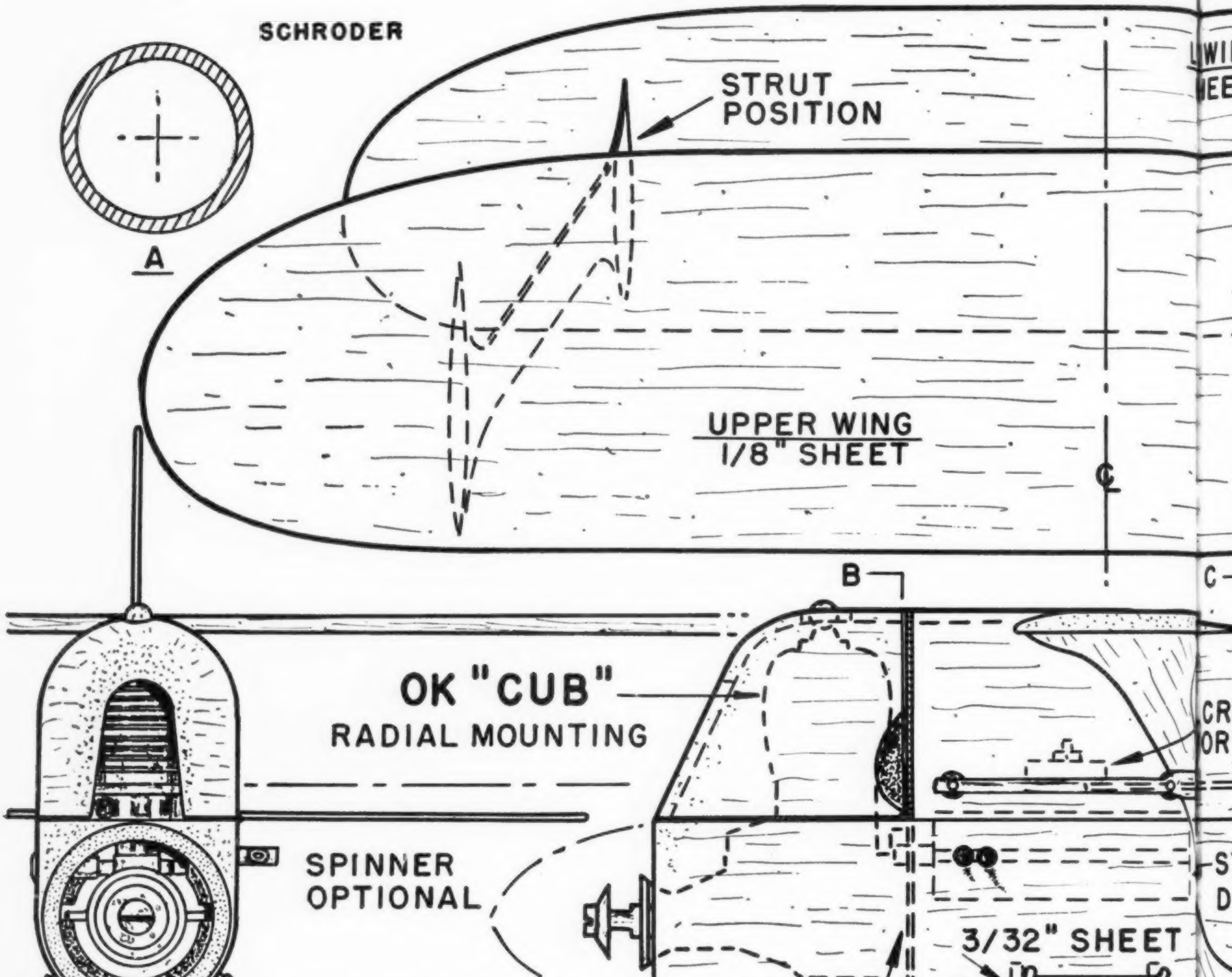
LANDING GEAR. Using .030 wire, make two of the usual U-shaped struts and solder together at the wheel-axle end as seen on the side view. To obtain the proper lengths, bend the front piece first, allowing an extra 1/8" on the front view,

(*Turn to page 56*)

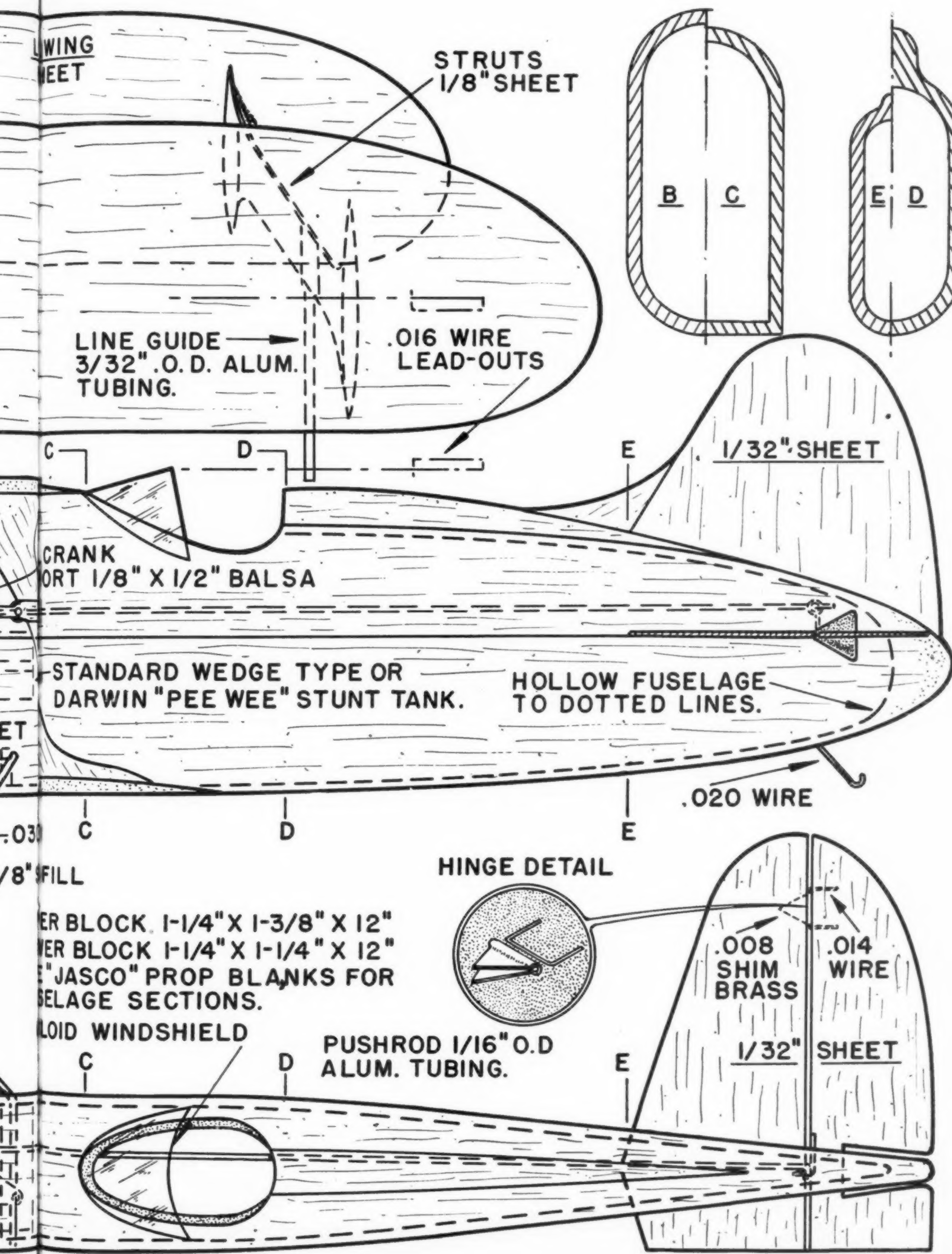


This tiny controliner was expressly designed for the new "middle baby class" engines, but will fly with motors from .02 to .09 cu. in.

SCHRODER



FULL SIZE


WING
EET
STRUTS
1/8" SHEET
B
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C
D
E
1/32" SHEET
CRANK
ORT 1/8" X 1/2" BALSA
STANDARD WEDGE TYPE OR
DARWIN "PEE WEE" STUNT TANK.
HOLLOW FUSELAGE
TO DOTTED LINES.
.020 WIRE
.03
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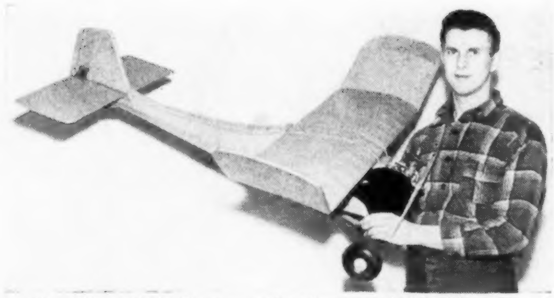
HINGE DETAIL
ER BLOCK 1-1/4" X 1-3/8" X 12"
ER BLOCK 1-1/4" X 1-1/4" X 12"
"JASCO" PROP BLANKS FOR
SELAGE SECTIONS.
LOID WINDSHIELD
.008
SHIM
BRASS
.014
WIRE
PUSHROD 1/16" O.D
ALUM. TUBING.
C
D
E
1/32" SHEET

Simple Pulse CONTROL

by E. PAUL JOHNSON



The author with R. C. plane equipped as described in this article

PULSE rate control for R.C. model airplanes was first introduced to readers of M.A.N. by George Trammell in the July, 1947, issue. While competing against Trammell in the 1948 Nationals, I was convinced by his spectacular performance that it was about tops in radio control. Pulse control is much better than the conventional escapement method because there is no necessity of keeping track of the sequence of the escapement. Mr. Trammell's control, as described by him in his article, is fine for the fellow with a complete machine shop, but for the average modeler a simpler pulse device is needed. I will describe in this article what I have developed along that line and have used with surprising success.

First let us analyze what pulse control is. If the radio equipment in the plane were arranged so that signal-on gave us right rudder and signal-off gave us left, we could fly a nice zigzag pattern, controlling with a key or switch. If the signal was turned on and off fast enough, the rudder would flip right and left so fast that the plane would fly on a straight course. If the signal was held on, the plane would circle right. If the signal was held off, the plane would circle left. All that is necessary now is to make the equipment to perform these operations.

Any transmitter and receiver can be used without change. The only alteration necessary is in the escapement. This change is a simple one that can be made easily by any modeler with only the tools that are necessary for general model airplane construction. The other equipment needed for keying the transmitter in pulses and for controlling the direction of the plane by the operator can be purchased from any model shop. The whole arrangement is so simple that even the novice can put it together. I'm sure if the reader tries this type of control he will be more than satisfied.

I am using a Good Brother's transmitter and receiver which is manufactured by Beacon Electronics, and an *Aerotrol* escapement with modifications which will be described later in the article. I can recommend this equipment as I have had excellent success with both.

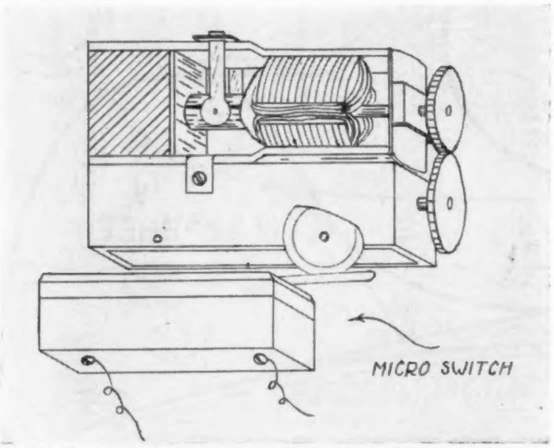
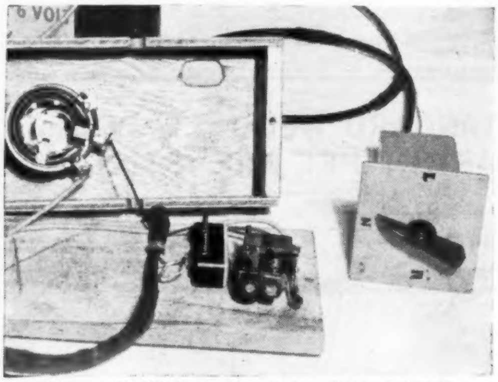


Fig. 1 A model train motor truck is the heart of the pulsing unit



Pulsing unit with its speed control; switch box at right

For a keying device to key the transmitter on and off, I used a HO train motor and driving unit. One of the wheels was filed flat on one side to form a cam, and a micro switch was placed so that it is turned on and off by the wheel (Fig. 1). Micro switches can be purchased from any radio supply or war surplus store. Take care when filing the wheel and keep checking the amount of time that the micro switch is on and the amount it is off during one revolution of the wheel. When the wheel is filed, the right amount the micro switch will be on one-half revolution and off one-half revolution. This will make your pulses even and keep your model plane flying straight when the operator's control is set on the neutral position. If the pulses are uneven, the plane will tend to circle right or left, depending on which pulse is longer.

The train motor is powered from a 6-volt Hot-shot battery and its speed is controlled by a power rheostat in series with the motor leads. These rheostats are used in model railroading as a speed control for the trains. The train motor I used was a 6-volt prewar model. These are rather difficult to obtain now because all the post war models are 12 volts. It was discovered by experimentation that the new 12-volt motors seem to run about as well on 6 volts as the prewar 6-volt models. So don't let it worry you if all you can get your hands on is a train motor designed for 12 volts. The ol' 6-volt Hot-shot will run her fine.

(*Turn to page* 41)

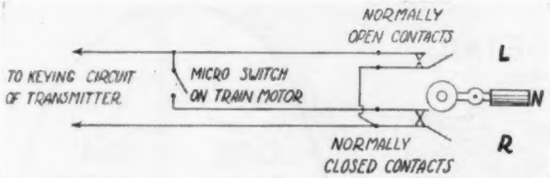


Fig. 2 Three-position control switch is connected this way

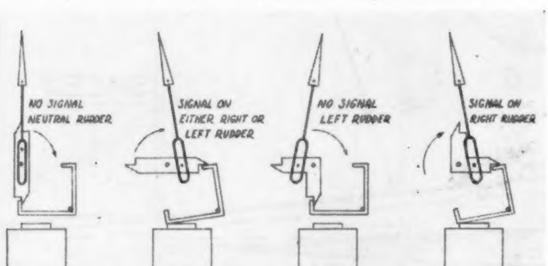


Fig. 3 Action of standard escapement, and of modified design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20 Years of M.A.N.

(*Continued from page* 11)

through his body. Still, on he came. The whirring prop blades came closer and closer, singing a duet of death. For a fleeting second they spun in unison, then met. A splintering crack and a thundering crash, as a pair of red hot motors crashed together." This spine chilling passage from "*One Life to Give*" along with similar penny-a-word flying stories like "*The Flying Black Sheep*" and "*The Avenger from the Skies,*" helped pep up the early issues. Some sounded like daytime soap operas. "Was Tad Wickers responsible for the burning of Tommy's plane? If not, why was he sneaking away from the fire that was consuming Tommy's hopes? Find the answers to these questions in the August issue of MODEL AIRPLANE NEWS . . . " This from the first issue. Whether this stuff or the model building section intrigued the kiddies most is indefinite, but buy the August issue they did, and many more thereafter.

The early M.A.N. was combined with JUNIOR MECHANICS, the combination being quite a fifteen-cents worth. You could, for instance, get model plans, sky thrillers, and plans for a summer cottage all tucked between one cover. Eventually, as the hobby became more popular, the fiction and the mechanics were dropped and models were concentrated upon.

Every modeler likes to "see what the other guy's doing"; And that's what put M.A.N. across. Since its inception it has presented the new, the unusual, and the better models. Model building might easily have stagnated without a binding link, a journal to report on what the experimenters and serious builders were doing. Wasteful, time consuming wanderings along already explored tracks could be eliminated, parallel experiments reduced so that modelers could devote all their time and talents to fresh, virgin fields of model design. The hobby forged ahead by leaps and bounds. Brown's miniature gas engine turned things upside down and attracted thousands of new modelers. This was the phase of modeling that appealed to many heretofore uninterested adults.

And so we entered the free flight gas era (and this is in no way intended to mean that that era has passed—not by long shot!). The first ships were experimental and operated under no rules of any sort, but the modeler himself was essentially the same then as now for, as usual, the first rules brought forth gripes. "Fer cryin out loud, only a 1/4 oz. of fuel per pound of model weight! That's just about enough to prime my job with." But as has always been the case, ships continued to go out of sight. The 1/8 oz. per pound and then the 1/16 oz. per pound rules too, were just one jump behind the rapidly advancing free flight enthusiasts and their fast climbing ships.

And, then as now, M.A.N. was a clearing house for gripes and criticisms, suggestions that helped formulate next year's rules, published discussions that let the average happy balsa hacker know that the rules were not made up by a group of stamp collectors (as has more than once seemed the case).

The "yo-yo's" sort of slipped in unnoticed. For several years ships were flown on strings and wires without anybody paying much heed. Suddenly they were accepted. "Free flight vs. control-line" arguments were rampant. Die-hard free flight addicts would have nothing to do with models with "strings attached."

(*Continued on page* 39)

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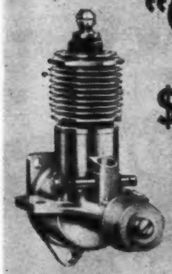

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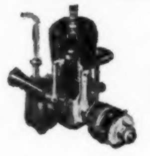

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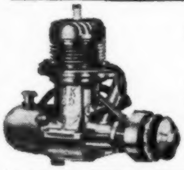

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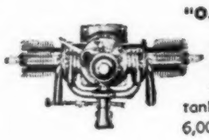

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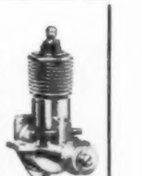

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But these same glue-stick wielders, who wouldn't think of building a controline model, avidly read M.A.N.'s articles on the whirling things. In this painless way, many a modeler was introduced to this new phase of modeling.

During the war controliners came into their own. Records were broken almost as they were established, but at the pre-hundred mph zone things snagged. The "cut and try" designs had hit their peak. Scientific design, coupled with ingenuity and imagination, was called for. M.A.N.'s design articles by the experts provided the "know-how" that made possible the construction of more than one speed ship. Airfoil selection and prop design became of paramount importance and MODEL AIRPLANE NEWS' articles discussed the factors to be considered in these all-important matters.

Never, though, has the fundamental purpose of M.A.N. been lost track of: its dedication to the youth of America. For always the beginner has been kept in mind, no matter how expert the "expert" writing the article, things are always explained clearly enough for the novice.

Most of the men in aviation today got their start building models. How many got started building models through reading MODEL AIRPLANE NEWS? How many more will be started in the *next* twenty years?

Flutter Wing

(*Continued from page 25*)

with the panels humming up to beat the band. Then as the down control began to take hold, the nose came down gradually until the normal flight path was resumed. By lengthening the control horn, the sensitivity problem was easily remedied, and it was found in later flights that the ship could be purposely made to hover at very steep angles with no signs of stalling out.

The best possible method of comparison was discovered in later test flights when we decided to hold the panels in a close horizontal position with scotch tape and fly the *Flutter Wing* as a conventional ship. With the panels held stationary in this manner, the plane flew as well as any sport U-control model of its type, perhaps even more stably than some because of the full span slot afforded by the space between the specially shaped leading edge and the edge of the panel. In flight it was noticeably faster than when flown with the panel in motion, but even with the slot it was quite apparent that the ship could easily be stalled out like any other plane of its type, and it lacked some of the smoothness in flight exhibited with the panel in motion.

After numerous flights with the panel both in motion and still, we are convinced that the *Flutter Wing* very definitely has something that a conventional wing cannot approach, and are certain that it is, at least in part, the solution to many of the problems now facing U-control stunt fliers. So if you've been following the crowd until now and feel the need of a change, why not flaunt convention by taking a crack at the *Flutter Wing*. It may pay big dividends in this season's stunt events. We suggest that you build the ship in the plans as a trainer and then design your own stunter such a wing.

The plans as presented here are one-third actual size except where full scale is noted. Enlarge them in the usual way by extending the one-inch graduations around the perimeter of the plan and using dividers.

The width of the fuselage shown will fit a *Bantam* engine or any other A or B engine with the same distance between mounts. Other engines may be accommodated by changing the width of the fuselage and bulkheads slightly.

Construction is begun by cutting the 3/16" square crutch members to the proper length from hard stock and gluing them to the motor mounts as shown. When they are dry, form the crutch by fastening them together at the rear and inserting the bulkheads. Next cut the fuselage sides from 1/16" sheet balsa and glue them in position to the crutch members and bulkheads. Now insert the 1/4" x 1/8" wing mount pieces and the 1/8" squares along the top and bottom of the fuselage.

Before continuing with the fuselage, the rudder, stabilizer, and elevator are built and installed. The rudder is cut from hard 1/8" sheet and sanded to the symmetrical section shown. The stabilizer and elevator are made from two sheets of 1/16" balsa, glued together with the cloth hinge between them. This produces a strong hidden hinge that will not be affected by hot fuels.

The stabilizer and rudder are glued in place and the control mechanism installed as shown. The wrist plate is mounted on a sheet of 1/8" plywood set in the fuselage as shown. The landing gear is bent from 3/32" piano wire and bolted to the firewall with brackets bent from .032" brass.

When the landing gear is mounted, glue the small tail skid block in place at the rear of the fuselage, and cover the top and bottom with 1/16" sheet, leaving the underside of the cowl open until the gas tank is installed and the motor mounted. The motor mount holes may be drilled now, care being taken to obtain the proper side thrust. Finally the fuselage is completed by adding the tail skid and wing mounting dowels, and filling the cabin top with 1/8" sheet balsa.

The construction of the wing is quite simple since the panels are the only built-up parts. They are made by pinning down the 1/8" square bottom spar and cementing the ribs in their proper positions. When these are dry the leading and trailing edges are added and finally the upper spar. Upon their removal from the board the panel frame works are covered with 1/16" sheet as shown and sanded to the proper finished shape. Since the main frame of the wing is the part that must withstand most of the strains encountered in flying, the balsa used in its construction should be hard stock. First, pin down the inside 1/4" square of the leading edge and glue the outside one to it as shown. Next, pin down the 1/4" square of the trailing edge and glue the 1/4" x 1" piece in position. At the center section insert the piece of 1/16" sheet and glue the ribs in place on top of it. Fill in the tips with 1/4" sheet and cut them to the proper shape. Now, cover the top of the center section with the 1/16" sheet, leaving space open for the aluminum tube bearings and the 1/8" square cap that fills in above them. When fully dry, remove the main wing frame from the board and carve and sand it to the shape shown. Upon completion, cover it and the panels with light weight silkspan, which will add strength to the entire structure and allow a better finish.

We proceed now with the installation of the panels and care should be taken in their alignment to insure true rotation. First, cut the 1/16" wire shaft to the proper length, making sure that it is absolutely straight; then with a file rough up the portions of it which will run through the panels so that glue may adhere to them more readily. Glue is now forced down into the panels, coating as many of the shaft holes as possible. Place the three aluminum tube bearings and the small washers in their proper positions at the center of the shaft and coat the roughed-up portions with glue. Finally, slide the panels on the shaft to their proper position and allow them to dry. When completely dry scrape the excess glue from the exposed ends of the shaft and the rotating member is ready for installation in the main frame of the wing. This is accomplished by first coating the slotted portions of the three center section ribs and the bearing notches at the tips with glue, with the washers and pieces of tubing then being added to the ends of the shaft. The whole panel assembly is then dropped into position and allowed to dry thoroughly. Now, test the rotation of the panels by adding a little light oil to the bearings and spinning them. The movement must be absolutely free and you should be able to maintain rotation by blowing lightly at the leading edge. If any stiffness is found, check the bearings and washers to see that they are clear of glue. When smooth rotation is obtained add 1/8" square caps to the center section and fill in above the tip bearings with scrap balsa. The line guide is then bent to shape and glued in the position shown. Finally, add the 1/8" dowel wing keys and the wing is ready for finishing.

The fuel tank is bent from .007 shim brass to the size and shape shown and the seams soldered. When installed it should fit snugly and remain solidly in place when the bottom of the cowl is sheeted. After sheeting the bottom of the cowl, cover the entire fuselage and tail assembly with lightweight silkspan to add strength and bond all seams. The entire ship is now ready for finishing.

Two coats of clear dope should first be applied, sanding between coats. This will remove the silkspan fibers and provide a good base for the finish coats of color dope. Four coats of color dope are applied with sanding between coats with 270 or 320 waterproof finishing paper. If you intend to use hot fuels, we would advise a protective coat of clear Dulux, or a standard fuel proofer over all.

As a novel touch in the finishing of your ship, we would suggest cutting your license numerals in half and mounting them on the panel, half on the top and the other half on the bottom. Reverse the procedure with every other letter. This will have the appearance of hieroglyphics when the panel is still but will form the full letters when the panel is rotating.

Flying the *Flutter Wing* should be a pushover for anyone who has ever flown a controline ship before, and because of its exceptional anti-stall characteristics even beginners will find the danger of cracking it up minimized. The only real departure from conventional flight techniques comes in the launching. After starting the engine, remember to start the panel rotating before you run out to pick up the control handle. It was found that with the motor running the panel will only rotate in the proper direction, i.e., counterclockwise looking at it from the side where the lines enter, so only a tap is needed to move the panel past dead center and the slip stream will do the rest. We would also advise you to bring a few husky friends along or at least rope off your flying area when you fly the *Flutter Wing* as it attracts a crowd faster than a fire sale. Believe us, we know!

Simple Pulse Control

(*Continued from page* 34)

A three-position telephone switch is used for the operator's control (Fig. 2). This switch has two sets of contacts, one set normally open and the other, normally closed. If the switch is turned right, the normally open contacts are closed and a steady signal is sent out by the transmitter causing the plane to circle right. If the switch is turned left, the normally closed contacts are opened and no signal is sent out causing the plane to circle left. If the switch is in center or neutral position, a pulsed signal from the train motor and micro switch is sent out and the plane flies straight.

The train motor, drive unit, micro switch and power rheostat were housed in a small box built for the purpose and connected to the transmitter by a short length of coaxial cable. A three-wire cable was run from this box to the three-position toggle switch, which is held in the operator's hand. It is advisable to have this cable long enough so that the operator can stand up and even take a few steps one way or the other in order to keep the plane in view at all times.

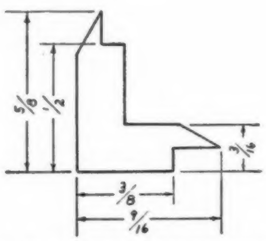

Fig. 4 New arm to be made for escapement

In constructing the control for the plane, the straight rotating arm on an *Aerotrol* escapement was removed and an L-shaped one put in its place (Fig. 3). *Caution*—be sure this arm is made of brass or some other nonmagnetic material. There are no definite dimensions for this arm. It is made more or less by a cut-and-try method. Make it slightly oversize, and by observation the amount to be filed off can easily be determined. The dimensions of the arm on my escapement are shown in Fig. 4. These can be considered a basis for the approximate dimensions necessary. A single loop of rubber was run inside the entire length of the plane fuselage to turn the moving arm. Every time a pulse is sent from the transmitter the escapement in the plane operates causing the rudder to flip right and left. When a steady signal is sent from the transmitter, the escapement is held in an operating position causing the plane to turn right. When no signal is sent from the transmitter the escapement is in nonoperating position and the plane circles left. Two thousand turns are put on the rubber, which is enough to flip the rudder steadily for 6 min. Since about half of the time you are turning right or left you have enough winds for a twelve-minute flight; the rubber does not unwind in the turns. I advise getting an indoor winder for putting the turns in the rubber. 2,000 turns put in with a drill or other low ratio winder is quite a tiresome job. Indoor winders can be purchased from Junior Aeronautical Supply Co. (JASCO).

I have made approximately fifty flights with my present radio controlled plane, using this equipment, and have never had

a mishap. It responds perfectly and there is no guess work or keeping track of the sequence of an escapement. When right rudder is given, the plane goes right and when left rudder is given, it goes left. Not only is this control simpler from the operators standpoint, but the equipment in the plane weighs no more than a standard escapement control. My present plane, complete with radio equipment, weighs 4-1/4 lbs.

I am sure anyone who tries this control will be satisfied beyond expectations. Try it out, and I'll see you at the next R. C. contest.

As A Wife Sees It

(*Continued from page* 30)

of matrimony") one thing has remained intact—the *Skyscrapers*. And their loyalty and devotion to it remains on the highest peak. I often wonder where the married ones ever found the time to woo and win a wife.

Contrary to public belief, I discovered model airplane building is not exclusively for children. In fact, while attending model meets, I was surprised to see that the contestants over twenty-one exceed those under this age by at least two to one. There is a good reason for this. Model building is an expensive hobby when you consider that many motors sell for about fifteen dollars. Then you have to buy wood, propellers, gas and a dozen other incidentals.

Model builders are marvelous for their inventiveness. One of the boys living with his family in crowded quarters took over a linen closet. All the linen was shoved into the already crowded clothes closet, and Bill managed to squeeze his six-foot frame into the 3' x 5' closet and wreak his madness there.

Now, let us discuss the airplane contests. This is the ultimate goal of the model builders. Now they find out how their plane stands up against all the others. There is various merchandise awarded at these contests for time, speed, stunts and beauty events. The merchandise usually consists of some good looking trophies (dust collectors!), motors that sometimes work, and donated kits and merchandise that are outdated, outmoded, or don't sell. This is what the model builders break their necks and risk a broken home for. For the New York metropolitan area, these contests are often held out in Long Island, and sponsored by different clubs and dealers. In a short time, this hobby may become obsolete as Levitt and other builders have erected homes on most of the former flying fields and the choice is becoming more limited each week.

As most of these contests take place on Sunday, my husband sits in the cellar all day Saturday, putting the finishing touches on his plane. We don't go out Saturday night because where can you go at eleven o'clock? We are up with the early birds that catch the worms on Sunday. This is the only day Jerry makes the bed, prepares breakfast, and washes the dishes. He is not henpecked, it's just that time's awastin'. I always pack a tremendous lunch when I accompany my husband to the field; he flies and I eat. Jerry seems to have no appetite at the field, just an unquenchable thirst. When the contest is over, he suddenly becomes ravenous, but there is no more food left by that time. Having nothing better to do, I have eaten it all up. (I usually gain about 10 lb. during a season.)

At the field, you meet the different types, the builders and the fliers. The builders hold a straw to the wind. If the straw sways ever so slightly, they do not fly. They would rather break an arm than risk scratching the littlest bit of paint off the plane. My husband is a flier. He designs his own planes, throws them together in a few nights, and if he doesn't crack up during the first few flights, he usually has a winner.

Aunt Sadie doesn't visit us any more. The lamps she gave us for a wedding present are down in the basement. There is no room for them in our home because of the trophies. They take up every bit of table space. I am really very proud of them.

If you are the wife of a contest flier, you must double your life insurance, especially if you accompany him to the field. You are continually in danger of being konked by an airplane, and you always risk an upset system, as there are never any wash rooms on these fields.

Recently I was out with my husband when he flew his newest plane. It went straight up about 500' which is very good (this means it had enough right thrust and left turn—or vice versa) and then it caught a thermal. The plane stayed in sight for about 4 min., then flew over a tree and was lost to the eye. Jerry jumped into our car, a '41 Oldsmobile (we just bought it last fall but after each season, our car is usually so battered up, we have to trade it in) and drove off in hot pursuit. Coincidentally, I was sitting in the car, eating the last sandwich and on my side the door was open. Luckily, I didn't fall out; I just dropped the sandwich with the sudden thrust of the car. We plowed through a field of waist-high grass looking for that four nights of work and sixteen-dollar motor. But was that enough? No, I had to get up and sit on the roof of the car where I could more easily spot the plane. I forgot my pride, skirt blowing in the air, and as there is nothing solid to hold on to on the flat of the roof, I held on to my faith. If I ever wondered where my husband's first love lay, I found out. Without a thought of my precarious perch, he drove wildly through the field, turning on two wheels, falling into the holes in the earth, bumping into rocks and making sudden starts and stops. I didn't tell him that the reason I didn't find his plane was because I was unable to look. I was paralyzed with fear and could only think of what kind of thud I would make make when I fell off. Then I helped him search through thistles and thorns, and all varieties of known and unknown shrubbery, amongst which I am now convinced there was poison ivy or poison oak.

After awhile he got disgusted and we returned to the field. He persuaded one of his buddies to go out with him, and wouldn't you know it, they returned two hours later, all beat up but with big smiles, and bearing the missing plane.

The crowning insult of the day occurred when Jerry asked, "How would you like to have your picture taken?" So I combed my hair, put on fresh lipstick, and got ready. He handed me one of his planes, "Will make the picture more interesting," he said. A few days later when the pictures were developed, there I was without a head. "But didn't the plane come out swell!" Jerry exclaimed. To this remark I started hurling all the detachable objects I could lay my hands on. But Jerry was no longer there—he had already started back down cellar to start work—for next week's contest!

Design Forum

(*Continued from page 26*)

plane to assume a diving position and lose altitude quickly.

Mr. White is particularly interested in the theory behind spoilers. Naturally, if it is known how spoilers operate they can be applied more effectively in any particular case. Basically, spoilers are a means of breaking the airflow over the upper surface of the wing which thereby reduces the wing's lifting effect. The upper surface flow, as many of you know, produces about three-quarters of the wing lift. If this flow is disrupted completely, three-quarters of the lift is eliminated.

Fig. 1 (upper sketch) shows a normal wing section with the airflow passing around it. A spoiler located on this wing at X is in deflected position, lying flush with the upper surface. Fig. 1 (lower) shows this spoiler in raised position and indicates its effect on the airflow. You will note that the flow is completely disrupted from slightly forward of the spoiler to the trailing edge of the wing, consequently this flow produces no lift. Another advantage of spoilers is their extremely large effect in proportion to their size. A very small spoiler will completely disrupt the airflow. The chord or height of the spoiler need not be more than 20% of the wing chord, its length span-wise also may be less than the span of the wing, to give nearly maximum effect.

Fig. 2 shows a plan view of the wing and the effect of a spoiler of about half the single wing span. Of course there are two spoilers, one on each wing, each spoiler being one-quarter the total wing span. The shaded area shows the surface of the wing over which the airflow is disrupted. You will notice that the disrupted area spreads out rearward from the spoiler at 45 degrees or more. Consequently, very large areas of the wing's upper surface can be blanketed by a comparatively small spoiler. We suggest, when you use spoilers as dethermalizers, that you make each of them equal to 25% of the *total* wing span, with one spoiler on each wing. Make their chord 20% of the wing chord and place them approximately in the center (spanwise) of each wing as shown in Fig. 2.

Spoilers should be hinged at their forward or lower edge to the upper wing surface and should lie flush with the surface when deflected. They may be operated by the pull of rubber bands which will raise the spoilers abruptly when a special timer located within the fuselage operates a release mechanism. Fig. 3 shows a simple arrangement which was invented and we believe was patented a number of years ago by that ardent modeler, Armand Vasquez. The timer is attached to a straight wire W which moves with the timer shaft. This wire passes through a bulkhead H, and when it is moved by the timer, the end of the wire pulls rearward and free of the bulkhead H. You will note that the wire passes through a loop, or ring, which in turn is attached to a thread running to the spoiler. When this loop is engaged by the wire, the thread is under tension and holds the spoiler tightly in deflected position against the tension of the rubber band in the wing. If the wire is moved by the timer and disengages itself from bulkhead H, its end continues to move toward bulkhead H2, and as it is drawn through this second bulkhead the ring or loop L is stripped from the wire, releasing the tension which holds the spoiler in deflected position. The spoiler (Figs. 1 & 3) therefore is raised suddenly by the tension of rubber band R. Mr. Vasquez's mechanism may be operated at an exact and specific time. Experimental flights will indicate the proper setting for the timer in order to be sure of a 10-minute flight. If it requires 1 min. for the plane to descend from its average altitude after the spoiler is raised, the timer should be set for 9 min. However, the safest procedure is to set the timer for 10 min. so that a 10-minute flight will be assured in the event the plane is at low altitude when the spoilers are released.

There is another very interesting and useful variation of this timer and movable auxiliary surface combination, one that has never been used but which will insure a faster climb, a slower glide and at the same time operate as a dethermalizer at the end of 10 min. This takes the form of a trailing edge flap instead of an upper surface spoiler. It has always been the problem to find a wing section that will give a combination of fast climb and slow glide. To climb fast the wing section should have an extremely high lift-drag ratio with a very low drag. However, sections with these characteristics usually are not good gliding sections because they do not provide a low sinking-velocity. For long glide, duration sections should be well curved, especially on the under-surface. However, such sections provide large drag at fast climbing speeds. Heretofore, compromise sections such as the Grant X8 and X9 have been used. These give a combination of the two factors to a high degree and today they still hold world records.

However, with a trailing edge flap,

various wing sections may be produced at the desired moment during flight to give (1) maximum speed, (2) lowest sinking velocity, (3) maximum drag with the least amount of lift for dethermalizer effect. Fig. 4-A shows a wing with a trailing edge flap raised to provide a fast climbing section. In B you see the flap depressed through the action of a timer release so that the wing becomes a high lift, low sinking-velocity section. In C, through further and final action of the timer, the flap has been pulled down to its maximum deflection where it creates excessive drag. This reduces wing lift so that the plane noses down and dives earthward.

The only difference between the operating mechanism of this flap and the spoiler is the addition of a second ring and controline to the flap so that it operates in two stages of deflection (see Fig. 5). When the first ring is released, a rubber band under tension pulls the flap down to position B; the flap is held in this position by the restraining effect of the second thread and ring attachment L2 and T2, still held by the wire on the timer. This second ring is located between a third and a fourth bulkhead, H3 and H4, and is held by the wire in the same manner as was the first ring. At the end of 10 min. the wire has been drawn beyond bulkhead H2, and ring L2 is stripped from the wire as the latter is drawn through bulkheads H3 and H4. Release of this second ring allows the rubber band to draw the flap down sharply into the dethermalizing position C. Fig. 5 shows the position of the 3 bulkheads used with the trailing edge flap. These should have the relative spacing required to release ring L1 at the moment of motor cut and L2 at the end of 10-minute flight duration.

We have received a letter from Jack Fassett, 22 Long Beach Avenue, Roosevelt, Long Island, New York, concerning propeller pitch. The function of propeller pitch seems to be a little obscure judging from his letter. Like a number of other fliers he appears to think that pitch *produces* a given speed for any given model and that the pitch must be governed only by the drag of the model. When figuring the correct pitch, think of only one thing—what will be the *speed* of your model—because the propeller pitch must be *coordinated* exactly with the actual flying speed of the plane and the speed is governed by the *power* as well as the drag. Also, it is impossible to determine the drag of any particular model without complicated and very precise tests in the wind tunnel. Calculations of drag in a model by other methods are extremely complicated and most often are inaccurate to a high degree.

Therefore, the only practical approach to this controline speed problem is to adjust the propeller pitch for the estimated maximum possible speed of a particular model with a particular engine, though this too is at best a cut-and-try method.

The first step is to estimate the maximum possible speed of the model or the speed at which you wish the model to fly. The propeller pitch must be based on this speed and must be such that the blade passes through the air at the most efficient angle as it turns during flight. This means that the *pitch speed* must be coordinated with the maximum airplane speed. The *pitch speed* is the pitch of the propeller, multiplied by the maximum revolutions per minute of the engine, with that particular propeller. If the maximum revolutions are 13,000 per minute and the desired airplane speed is 120 mph, then a propeller pitch will have to be selected which will provide a pitch speed of not less than 124 mph. In other words 13,000 times the propeller pitch in feet must equal between 12,720 and 13,000' per minute (124 to 126 mph). A pitch of 12" with the engine turning 13,000 rpm will provide a pitch of 13,000' per minute. This is more than the speed of the airplane by about 22%. This extra 22% of pitch speed is necessary to allow for propeller slip. The propeller blades must pass through the air at a slight angle of attack, about 3 to 4°. Therefore, the propeller does not actually progress forward at its full pitch speed, but actual forward movement is approximately 83% of its total pitch speed. The objective for maximum thrust is to have this forward progression equal exactly to the *maximum speed of your airplane*. The *pitch speed* of the propeller in such a case is the *speed of your airplane plus the propeller slip*.

It is true that the drag of your plane may be so great that the plane will not fly at the desired 120 mph. The only way to achieve this high speed in such a case is not to change the pitch of the propeller but to increase the power of your engine because usually when a plane has excessive drag and flies slower than the designed speed, the propeller and engine will not turn at the maximum calculated revolutions per minute. Instead of 13,000 rpm they may turn only 9000 or 10,000 because the airplane has excessive drag for the power of the engine.

If you can not reduce the drag or increase the engine power then the only possible method is to reduce the propeller pitch until the engine turns at its maximum rpm of 13,000. Of course, *under these conditions the maximum flying speed will be reduced* and you will not fly the desired 120 mph. All that you will be doing is to obtain maximum engine efficiency.

Another method to bring up the rpm of your motor to the maximum is to cut down the width and/or the diameter of your blades. This reduces the propeller resistance so the engine can rev-up faster and in this way you can obtain the desired pitch speed for your propeller. In such a case, if the drag of the airplane is excessive, the blades of your propeller may pass through the air at an excessive angle of attack; in other words the slip may be excessive. This will reduce propeller efficiency but it may increase the top speed of your airplane due to the greater engine speed, because the engine will be delivering greater power at the increased rpm.

In this case (after you have cut down your propeller blades) you can tackle the problem of reducing the airplane drag by streamlining, which in turn will allow the plane to travel faster and thus will reduce the propeller slip. (Reduction in slip increases the propeller efficiency, provided the slip is *originally excessive*.) Greater speed therefore will result not only from reduction in drag but also from increased propeller efficiency. Through this step-by-step method, model builders may achieve their chosen design speed. With each one of their successive building projects this maximum speed can be stepped up and may easily bring them within reach of the world's record.

We hope that this not only answers Mr. Fassett's question but also the questions which we received in a letter from Mr. Nick Mikoliza of 311 East Main Street, Neosho, Mo.

Air Ways

(*Continued from page 27*)

crowded bus or struggled back to the field after a cross country chase, can see the virtue of these *miniature* models.

Lastly, we sense growing interest in scale modeling. Spectators at the '48 Nats will tell you that the scale controline event drew a bigger crowd than anything on the field. If it hadn't been for the fact that both the time and location of the flying scale rubber event had to be shifted at the last moment, we suspect that this contest too would have reflected the growing interest in realism.

Well, trends come and go—they always have in model aviation, and as long as they continue to do so, our hobby will continue to flourish.

* *

A brand-new jet speedster is displayed by Russell Dunham, Kenyon College, Gambier, Ohio, in our first picture this month. The ship is powered by a *Redhead Dyna-Jet*, and Russ expects it to go around 130 mph. A new innovation is a small air scoop used to pressurize the fuel tank.

Ralph Jones, 341 Emerson Street, Palo Alto, Calif., built the portable Stroboscope which appears in photo No. 2 from MODEL AIRPLANE NEWS, March '49 issue. Mr. Jones had a bit of difficulty in getting his unit to operate successfully when first constructed. He found that the terminals of the high voltage batteries were coated with wax, the resistance of which apparently lowered the total high voltage sufficiently to prevent proper operation. After the terminals were cleaned off, the unit was found to be highly successful.

A sample of the type of soaring glider now popular with German model builders appears in picture 3. This beautiful ship is the work of Alfred Richter, and the photo was sent to us by his friend, Rolf Lane. Mr. Richter is interested in corresponding with American builders, particularly those interested in soaring gliders and free flight models. He may be reached at: 24a Hamburg-Harburg, Grumbrechtstr. 70, Germany. Mr. Lane, 24a Hamburg 20, Hegestr. 19, Germany, would be glad to correspond with any model builder in this country, England or France.

The exceptionally fine S.E.-5a plane appearing in photo No. 4 is the work of Corbett K. Bates, 1836 North Boulevard, San Leandro, Calif. It is, of course, a controline job and is powered by a *Vivell* diesel. The ship is marked as authentically as possible to represent a plane of the 85th R. A. F. squadron, of which Billy Bishop was at one time a commander. The model was built on a scale of 1″=1′, the details having been obtained from Wylam plans which appeared in M. A. N.

Picture 5 shows a very fine R. C. flier designed and built by Eut Tileston, Mesa View Ranch, Craig, Col. When this photo was taken, it was equipped with a pair of dural skiis and operation with this sort of landing equipment had proved very satisfactory. The ship is fitted with a two-channel radio system, but considerable difficulty has been had in getting the two receivers to work properly. One channel operates tabs on the butterfly tail, and the two halves of the control surfaces are moved independently. The effect of this is to produce an upward pattern in the turns. The other receiver is connected up to give control over motor speed. The ship has a span of 80″, an area of 800 sq. in., weighs 4-1/4 lbs., and is powered by an *Ohlsson 60*.

Our last photograph shows another successful *Hoverbug* made from MODEL AIRPLANE NEWS plans. Constructor Bruce Anderson, 60 Duncan Avenue, Cornwall-on-Hudson, New York writes that he can easily obtain altitudes of over 25' when using six strands of 1/4" flat rubber. Instead of the control system shown on the original planes, Mr. Anderson used a small sliding weight with very gratifying results.

NEWS OF MODELERS

PEN-PAL SEEKERS: Floyd Carter, 9632 San Vincente, South Gate, California . . . Salvador Bellver Cortes, calle Conde de penalver, n. 16, Madrid, Spain . . . Johnnie Deitch, 520 Pine Street, Williamsport 8, Pennsylvania.

EXCHANGE MOTORS: J. C. Truscott, One The Drive, Westcliff-on-Sea, Essex, England . . . W. G. Child, 52 Playfield Road, Burnt Oak, Edgeware, Middlesex, England . . . R. A. Meanwell, 39 Rickard Street, Northampton, England . . . Betsy Ros, Almelosestr. 69, Borne, Holland.

EXCHANGE MAGAZINES, PLANS, ETC.: Jim Lang, 31 Fisher Road, Oldbury, Birmingham, England . . . Hedeya Ando, 6-126 Asagaya Saginami-Ku, Tokyo, Japan (writes in English) . . . P. Bainbridge, Four Irthing Avenue, Newcastle-on-Tyne 6, England . . . Ron H. Greaves, *South Birmingham Model Flying Club*, 47 Moorpark Road, Turves Green, Northfield, Birmingham 31, England.

SPECIAL REQUESTS: W. H. Ostenberg, III, Midwest Amusement and Realty Company, Scottsbluff, Nebraska, is trying to locate some plans for model airplanes put out in kit form a number of years ago; namely, DH-4, 1931 Boeing P-12-C (Cleveland Kits), Peerless-Cabin Waco "YKC," and Toledo Model Co. Waco F-3 Sports Plane. J. C. Niesthoven (Wezenstraat 28, Den Helder, Holland) would like to correspond and exchange merchandise with a member of the Boy Scouts and/or Air Scouts. William Dennis, 408 McKinley Avenue, Minerva, Ohio, is 20 years old and only 4' 8" tall. He wishes to correspond with someone in England or America who is interested in models. Fred W. H. Wilkes, 4013853 A. C., HMT, Y25, 3 Wing, 2 R. S., R. A. F., Yatesbury, Calne, Wilts., England, wishes to contact someone who would swap some of the old-time automobile kits advertised in MODEL AIRPLANE NEWS for English model items.

CLUB NEWS

Arkansas

John Miller recently wrote us about the *Buzz Cats Model Club*. They held their first meet on April 3. The *Buzz Cats* aren't even six months old. Gene Moore won *Class B Stunt;* Sam Wood—*Class C Stunt;* John Miller—*Class B Speed;* and Marl Haigwood—*Class C Speed.*

California

The *Los Angeles Aero Modelers* held their first rubber contest for this year on April 3, at Western-Rosecrans field. The weather was good but the spectators were a great hindrance to R. O. G. attempts! The Lakewood and Huntington Park Wings, spark-plugged by Lew Mahieu (West Coast Reporter for M. A. N.) and Granger Williams conducted operations. Results: *Class C Combined*—Leon Mor-

ris 17:46.6; *Jr.*—Howard Zalkin 6:32.6; *Class D Combined*—Al Trainor 13:59.7; *Jr.*—Gene Wallock 4:19.0; and *Wakefield*—Dick Schumacher 13:31.4.

Following are the winners of the 11th Annual Free Flight Gas Model Airplane Contest of the *Bakersfield Gas Model Airplane Association,* held at Famoso Airfield, April 10, AMA sanctioned: *Class A*—Bob Hanford 21:58.4; *Class B*—Fred Morgan 24:54.0; *Class C*—Dennis Davis 30:00.0; *Class D*—Fred Ginder 22:11.0; *Appearance Award*—Del Swartz; and *Special Award, Engines .050 or less*—Ted Peakert 9:05.7.

The *Orange County Thunder Bugs* held their first County Controline Contest April 3, at their recently completed model flying field in the Orange County Park. Results: *100 Lap Race (Class A & B)*—Jerry Gaston; *150 Lap Race (Class C & D)*—Robert Garrison; *Speed A & B*—Tom Jentges; *Speed C & D*—Tom Jentges; *Novelty Aircraft*—Fred Nuslein; *Scale Aircraft*—George Morris; *Advanced Stunt*—Charles Bauer; *Expert Stunt*—Bill Hagthrop; and *Jr. Beginner Stunt*—Ralph Garrison.

Sec. Connie Devitt writes that a new controline club was organized March 23—the *San Bernardino U-control Club.* There are 15 enthusiastic charter members. One of the first activities planned will be a public show to attract new members and to develop public interest.

Under skies that threatened downpour, February 20, the *Northrop Model Mechaneers* held a successful mid-winter U-control contest on the school grounds. Results: *Class B*—Don Newberger 118.03; *Class C*—M. H. Clegg 125.96; *Class D*—Don Newberger 141.62; *Workmanship*—Howard W. Waldo; *Precision Pattern*—Russell Snyder; and *"Goats"*—Joe Reynolds.

John A. Acker, Jr., publicity man for the *Inglewood Flightmasters,* tells us they are now leading the *Los Angeles Aeromodelers* interwing race for the big trophy. Over 20 different engines were shown at a recent meeting—only four were American. The great majority of these engines are active in sport type models. Dick Schumacher lent them four diesels from his collection and also furnished some fine movies of a 1937 contest. Their glider enthusiasts want *3 gliders* allowed in outdoor H-L events!

Results of the *S. F. Vulture Meet,* March 20: *H-L Glider Open*—Mike Demos 1:09.6; *Sr.*—Angelo Lo Castro 1:03.8; *Jr.*—Jack Ritner :43.8. *H-L Stick Open*—Carl Rambo 22:57.2; *Sr.* Eddie May 10:03.1; *Jr.*—Ronald Atwood 8:14.4.

Florida

The dedication of a model flying circle, in late January, was a real boost for the model airplane builders of Pinellas County. Mayor Bruce Blackburn officially named the miniature field "Woodlawn Flying Circle." A model flying meet was staged in honor of the occasion with modelers from throughout Pinellas County and New Port Richey competing for awards and prizes. NAA'er Bart Bryan reviewed the history of the development of the flying circle, the official dedication of which was the climax to a year and a half of effort.

Indiana

Here are some of the goings-on at the latest *Indiana Association of Model Airplane Clubs* meeting. The *Elwood Prop-Busters* announced their plans for a new Youth Project in cooperation with the American Legion. A course of instructions in model building and flying, for the youth of their City, will be started in the near future, with all the fees received given to the students in supplies and future contests. The *Purdue Aeromodelers* voiced their opinions and beliefs that one has to educate the public concerning model building and flying. They are planning exhibitions and demonstrations in an effort to do this and to interest more youth in their area in the hobby. The *Anderson Johnnies* suggested that the members of the IAMAC have a traveling prop or some other trophy which would be passed from one club to the other by a visit at a meeting. This idea was suggested to promote a closer association between the members of the Association. A short discussion followed, but the suggestion met with general disapproval because of the inconvenience of travel during the week, when most meetings are held. Jo Braum, president of the new *Kokomo Flying Wildcats,* gave a review of the activities of his club. He reported wonderful cooperation on the part of the Kokomo American Legion Post and the Junior Chamber of Commerce. Thanks for the above information which was sent to us by Sec. Glenna Williamson.

Missouri

Harry M. Bartell (8518 Elmore Ave., University City, Mo.) is seeking members, particularly among the younger set, for the *Universal-Aires.* He recently wrote us that the University City Park Board plans to open the University City Municipal Flying Field. If all goes well in the

COMING CONTESTS

June 12, PA.—Philadelphia, 1st Model Airplane Meet, *Exchange Club of Mayfair*, F, CO2, U, G.
June 12, PA.—Burgettstown, Hillman's Model Airport, *Pittsburgh Model Airplane Control-Liners*, RC.
June 19, ME.—Augusta, *Augusta Flying Maniacs* 2d Annual Model Derby, U, S.
June 19, CONN.—Bridgeport, *Bridgeport Aero-nuts*, U.
June 19, PA.—Burgettstown, Hillman's Model Airport, *Pittsburgh Model Airplane Control-Liners*, Free flight Duration & Precision.
June 19, WISC.—Beloit, 3d Annual U-control Contest, AA, *Thermal Duster Club*.
June 25-26, LA.—New Orleans, 9th Annual Gulf States Model Airplane Meet.
June 26, PA.—Burgettstown, Hillman's Model Airport, *Pittsburgh Model Airplane Control-Liners*, Free Flight Duration & Precision, Unit No. 1, Type D.
June 26, MINN.—St. Paul, *St. Paul Modeleers Aero Club*, F, AMA sanctioned.
June 26, CALIF.—Los Angeles, *Los Angeles Aero Modelers*, F.
June 29, ILL.—Chicago, Midwestern States Contest, *Chicago Aeronauts & Gas Model Aeronuts*.
July 3, PA.—Burgettstown, Hillman's Model Airport, *Pittsburgh Model Airplane Control-Liners*, Team Competition.
July 3, FLA.—Jacksonville, *Jacksonville MAC*, Free Flight Meet, RC included.
July 4, ILL.—Chicago, 6th Annual Midwestern States Model Airplane Championships, F, R.
July 4, CONN.—New Haven, U-Control State Champ. Meet, sponsored by *Sky Wolves & Gas Bugs*.
July 10, N.Y.—Mamaroneck, *Airbusters Model Club*, 2d Annual AMA sanctioned contest.
July 10, PA.—Burgettstown, Hilman's Model Airport, *Pittsburgh Model Airplane Control-Liners*, Free Flight Duration & Precision, Type D.
July 10, CALIF.—Long Beach, *Long Beach Jr. Chamber of Commerce*.
July 10, CANADA—Ontario, 11th Annual International Model Aircraft Contest.
July 16, CANADA—Brantford, *Kloudsters of Brantford*, F.
July 16-17, KY.—Louisville, *Louisville A. B. C. Model Club*, F, U.
July 17, PA.—Burgettstown, Hillman's Model Airport, *Pittsburgh Model Airplane Control-Liners*, Precision.
July 17, CANADA—Brantford, *Kloudsters of Brantford*, U.
July 17, N. Y.—Watertown, 5th Annual Northern N. Y. Meet, *Watertown Aeromodelers*, AMA sanctioned.
July 18, ILL.—Chanute Field, Air Force Base Contest, AMA sanctioned, U.
July 24, PA.—Burgettstown, Hillman's Model Airport, *Pittsburgh Model Airplane Control-Liners*, Marathon Type M for first 2 hr.; exact duration rest of time, Type E.
July 26-31, KANSAS—Olathe, 18th National AMA Championship Meet, AAAA.
July 31, ORE.—Portland, 2d Annual Free Flight Contest, *Multnomah Doodlebugs*.

U—Controline; F—Free Flight Gas; R—Free Flight rubber; G—Glider; RC—Radio Control; W—Water Events (ROW); S—Scale; I—Indoor.

future, the Park Board plans to open up more flight circles. The area which this field is in is also big enough to fly small free flight ships on calm days.

New Jersey

Sec. Ronald Denk (1081 Overlook Terrace, Union) of the *Union Model Airplane Club*, is quite proud of the successful results of the Beauty Contest held decently. The event was open only to club members. Nick Klym won top honors and Douglas Denk took second place. Mayor F. Edward Biertuempfel was an honored guest.

New York

In Clyde, New York, there is a very active club with 50 enthusiastic members —*The Planesmen Flying Club.* Russell K. Himes (Box 56) tells us that only during the past year has the club really begun to get into full swing.

Oklahoma

Sec. Dan Marek of the *Oklahoma City Glo Bugs* sent us the results of the April 24 Combat Contest, none too soon. B. J. Holt won First place in the *Open* event and Leroy Ritchie won in the *Junior* event.

Pennsylvania

The *Model Airplane Club of Lancaster* has reorganized after a lapse of one year. The new name is *Flying Aces*. In the recent election of officers Paul J. Liller was nominated President, Al Getty—Vice President, Charles A. Moser—Secretary, and Stewart V. Hikes—Treasurer. There are 40 members. The *Flying Aces* are eager to have all model enthusiasts drop around to see them; meetings are held the first Monday of the month at the Garden Spot Air Park, 8 p.m.

Two films on aviation were shown at a recent meeting of the *Bristol Aeromodeleers*. These films were authentic stories of the Eighth Fighter Group and the Fourteenth Air Force. Other films of a similar nature, it was announced, will be shown at future meetings. All of the club's active members recently attended a meeting of the *Mayfair Modelmakers*.

The Quakertown Masonic Hall was jammed to capacity the evening the First Annual Hobby Show was sponsored by the *Quakertown Kiwanis Aero Jockeys*. In the men's division of model planes, Pitt Hartzell won first prize. For the women's division, Mrs. Marion Huber took first place. The Junior award went to Eugene Huber.

England

Publicity Officer of the *Leeds Model Flying Club*, V. R. Dubery (Ellen Close Gardens, North Lane, Leeds 8), recently wrote us about the club. We thought, after reading the letter ourselves, that perhaps some of the readers as well would be interested in hearing about the club's struggle in the model field. The following is an excerpt from Mr. Dubery's letter.

"We live in a highly industrialized area, and where there are no factories, there are thousands of houses or, on the outskirts, farms and woodland. The result is that we have no free flight flying ground. To overcome this we have a technique of 'controlling' free flying models by careful selection of take-off points and regard to wind direction and we have quite successful flying of rubber-powered and glider models this way, within the city boundaries on playing fields and common land. During the mild winter we have just had, even high performance Wakefield models were tested and trimmed to contest pitch. When the contest season starts, however, we travel to an aerodrome 20 miles away by motor coach or to the moors on the foothills of the Pennine Range. For this purpose, we book the coaches 4-5 months before the season starts; otherwise we cannot have them. There are few of us who have cars or the gas to use in them for trips like this.

"The free flight power boys have to wait until they can join in these excursions before any model can be test-flown, but we are lucky to have scope for U-control flying locally that is safe from too many spectators or complaining householders. The field will take four circles and is quite busy any reasonable Sunday morning. No member has, as yet, been through the whole stunt schedule."

New Zealand

The *Hamilton Model Airplane Club* turned out a grand show, fully up to their high prewar standards, at Rukuhia, Hamilton. Visitors were from *Auckland, Wanganui, Rotorua, Tauranga, Paeroa, Te Kuiti, Matamata, North Shore,* and *Hurricane* clubs. Results: INDOOR *Open H-L* —R. Keegan 6:55.6; R. T. P. *Class A*—A. MacDonald 4:41.4; OUTDOOR *Glider H-L*—L. Fellows 1:55; *Towline 100'*—V.

Gray 9:44; *Spar H-L*—V. Gray 12:30.6; *Fuselage ROG*—N. Hewitson 5:45.4; *Gas 20 sec. H-L*—A. Tustin 2:19.4; *Gas Stunt*—A. Leong. *Grand Champion*—A. MacDonald 46 pts; *Junior Champion*—J. Woodley.

South Africa

The *Eastern Province Model Aircraft Association*, Port Elizabeth, is now non-existent. It is assumed that the *Association* never really recovered from the shock of losing three of its foster parents (Hope, Scott, and Sidney) during the latter part of 1947.

Jimmy Louw and Chippy Wannenburg. of Cape Town, have joined Bob Masters and Willie Schlaphoff in the *Jet Jive Jitterbug Biz.*

Mrs. Moelwyn-Hughes, Mayor of the City, congratulated the *Border Bods* on the splendid show arrayed in the huge Manning and Patterson showroom at East London. The Mayor stated that she knew very little of aeromodeling but what she had seen had been most interesting. At times the officials were almost overwhelmed by the hundreds of spectators who thronged the hall. The 100 models covered the full range of the 20th Century Hobby. The special display of engines attracted considerable attention. Controliners were very much in evidence and there is no doubt that both stunt and speed planes appeal to a large number of the *Border* modelers.

Fairchild T-31

(*Continued from page* 19)

wings in the same airplane. A design competition was held and the North American T-28 was selected. An order for 266 was awarded and construction began. The idea was to take the student from neophyte to wings in the T-28, thence into the two-seat Lockheed TF-80C trainer and finally into the F-80, F-84, F-86, etc., combat types.

Although this basic scheme is still the official Air Force program, some fighter units were assigned experimental programs for taking students directly from the T-6 trainer into the F-80, and even though some students actually made this abrupt transition successfully, it became obvious to the Air Force Training Command that their decision actually meant biting off more than a normal student could chew. The T-28 program was left intact, but the Air Force began casting about for a primary trainer to prepare the student for the T-28 advanced stage and, thence, the TF-80C and F-80 combat stages.

Accordingly a competition was held at Wright Field between the Beach Model 45, the TEMCO T-1A, and the Fairchild XNQ-1; the latter was declared the winner. Accordingly, a contract was awarded Fairchild Aircraft Division for 100 of the type designated T-31A-FA. *This* is the Air Force story.

The Navy side of the story is less involved for it is a product of the continuing Navy Bureau of Aeronautics aircraft development and procurement program. Fairchild submitted its primary trainer design, the Model M-129, to the Navy and received an experimental order for two airplanes plus one static test model, to be designated XNQ-1. The first airplane was completed in the Fall of 1946 and made its first test flight October 18, 1946, at Hagerstown, Md., site of the Fairchild factory. The second airplane flew in February, 1947, and both were delivered

to Naval Air Test Center, Patuxent, Md., for standard flight evaluation tests, which continued throughout the year.

The Air Force evinced interest in the design in the spring of 1948 and one airplane was delivered to Wright-Patterson Air Force Base, Dayton, Ohio, for flight tests, which also continued throughout last year. Meanwhile, the Navy prepared a procurement order for 40 NQ-1 airplanes in its fiscal 1949 appropriation list but later withdrew the request in order to delay it for one year. But the item did not turn up in the fiscal 1950 request; the Navy asked only for 10 jet trainers.

In choosing the Fairchild primary trainer the Air Force has selected quite an airplane. It is simple and straightforward but in that simplicity lies its remarkable performance and the controllability so essential to student training. Externally it looks like a modernized SNJ/T-6, with smooth engine cowl, and huge bubble canopy.

One of its modern features is its standardized safety cockpit arrangement. Each instrument is arranged, mounted and designed for its functional use. There are no projecting gadgets, overhanging controls, or misplaced dials. Everything has been arranged in exactly the style and manner the student will find when he flies a 600-mph jet fighter or a 5000-mile long-range patrol plane. The safety feature of this functionality lies in the characteristic shapes of the various system control handles. For example, the landing gear position selector handle is in the shape of a tiny landing gear wheel, the flap handle in the airfoil shape of a flap, etc.

The structure is metal throughout with the rudder, elevators and ailerons fabric covered. The wing is built up on two main spars which connect to the center section panel. The flaps are metal covered and extend inboard from the aileron to the fuselage. They are carried on external hinges which provide a slotted-flap design in the extended position, thereby increasing flap effectiveness.

The landing gear is conventional tractor layout with the main gear folding inboard to a position ahead of the front spar into formed fairing pans at the intersection of the wing leading edge with the fuselage. Small electric motors are used for main gear operation. The gear has a tread of 9′ 2″.

Power is provided by a Lycoming R-680-13 nine-cylinder radial air-cooled engine with a normal rating of 280 hp and with 295 hp available for take-off. This engine is fully cowled, with engine cooling air, and exhaust exiting out of louvers around the periphery of the cowl, instead of through a continuous gap as on conventional installations. The Hamilton Standard two-blade constant-speed propeller is enclosed in a spinner assembly which reduces shank drag and further aids engine cooling. Fuel is carried within the wing, with a capacity of 80 gals.

The T-31 weighs 2817 lb. empty and has a gross weight of 3750 lb. This 933-lb. useful load is made up of the student (200 lb. fully equipped), instructor (200 lb.), 80 gals. of fuel (480 lb.) and 6 gals. of oil (53 lb.). As a primary trainer, the plane carries no armament or other disposable load.

The new trainer has a top speed of 166 mph at sea level and cruises at 65% normal rated power at 142 mph. It has a stalling speed (with full flaps and one-half fuel load) of 55.6 mph. It has an initial rate-of-climb of 1070′ per min. Its service ceiling is 19,500′. It can remain aloft at 90% of its top speed for 4.7 hrs. and has a maximum range of 900 mi. at 110 mph. It takes off and clears a 50′ obstacle in 1190′.

With these complete weight and performance figures available, it is possible to compare the T-31 with other military trainers and personal aircraft of similar characteristics. For example, it is the heaviest primary trainer ever procured by the Air Force, reflecting its all-metal construction and elaborate cockpit layout. But it is by all odds the fastest primary trainer ever built, which results from its use of the greatest power ever used in a primary trainer.

To compare it with more familiar personal aircraft, although it weighs considerably more, and is substantially larger, it is roughly comparable to the Cessna 190 (MODEL AIRPLANE NEWS, May, 1949, issue) or 195 in power and performance. But, whereas these models sell for $14-15,000 each, the NQ-1 will cost about $50,000 each, reflecting the greater strength, complexity and enormously more elaborate instrumentation, equipment and furnishings. The T-31 has been designed from the start as an acrobatic airplane, to teach pilots such basic maneuvers as stalls, spins, rolls, dive pull-outs, and even an occasional loop or two, something no personal aircraft is designed or equipped to perform. This means higher design load factors, strength and weight of structure. This price also reflects the tremendous post-war increase in the cost of design and construction of military aircraft, now about $22-25 per pound of airframe weight, compared to $10-15 during World War II.

The Air Force contract of about $8,000,000 for 100 T-31 trainers (including spare parts, etc.) was approved by President Truman January 6, 1949, and work is already under way on the new production line at Fairchild's Hagerstown (Md.) plant. Since the airplane was designed from the start for productibility, the first production planes are expected to be in the hands of the Air Force Training Command by May, 1950, or just one year from the date of production initiation.

But by ordering a Navy airplane, which had already been extensively evaluated, the Air Force has saved an estimated $2,000,000 in development costs and about two years in time that would ordinarily have been required if a brand-new design had been undertaken. By such co-operation the services will save the taxpayers millions of dollars and obtain the best airplane for the job in the bargain.

Goosey Gander

(*Continued from page* 21)

natural curve can be given to the wing sheets by slightly wetting their upper surface.

While waiting for the cement to dry, the stabilizer sheet may be cut; one-half of it is shown in full scale on the plan. The full sheet should be 12″ long and 2-1/2″ wide. Cut out four ribs and cement them to the sheet with their front edge flush with the leading edge of the sheet at the positions shown on the plans.

Next the fin may be cut out to the proper shape from 1/32″ balsa. The fin base strips are cut from 1/32″ balsa. These two strips are cemented to the base of the fin, one on each side, as shown in the drawings.

The two wing halves must be bevelled at their inner edges and cemented together to give the correct wing dihedral.

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Bevel the ends of each half-wing by rubbing them over a piece of sand paper lying flat on your table. When the wing butt ends are rubbed back and forth over the sand paper, the wing should be held at approximately the correct dihedral angle. This gives an approximate bevel. Trim the bevel carefully with your knife and sand paper so that these two beveled ends of the two half-wings butt together and fit perfectly tight *when the wing tips are raised at the specified dihedral angle.* This is given in a diagram on the plans. When the two wing halves fit, cement them together, holding them in place rigidly with pins through the two center ribs while the cement is drying.

The keel may be made next. This is composed of three 1/32" sheets cut to the outlines given in the plans and then cemented together. The plans are one-half size, so a full size pattern should be made before you cut the sheets. Note that the *center sheet* is deeper than the two outside sheets and that *the grain runs downward* and to the rear diagonally. Several strips of 3" wide sheets may have to be cemented together edgewise to give proper length of fin. The two outside sheets are 5/16" narrower than the center sheet, as indicated on the plans, and *their grain runs lengthwise.* To complete the keel cut a strip 9" long and two strips 23" long, all 5/32" wide, from 1/32" sheet. The short strip is cemented to the front end of the center sheet and the two long strips to the top of the keel on each side of the center sheet and to the short strip, (see keel assembly drawing). Let the assembly lie on a flat surface while drying. Press all parts tightly together and make sure that they are properly aligned and straight, otherwise your fuselage may be crooked.

Next cement the wing leading and trailing edge strips in place, as shown in the wing assembly sketch. These should extend out beyond the edges of the wing, about 1/16" all around. Cement the stabilizer, leading and trailing edge strips in place in a similar manner. All strips should be cemented firmly to the ribs and edges. When the cement is dry, trim the edges down carefully to the outline of the sheets, then round the leading edge of the wing with fine or medium sandpaper. Sand the trailing edges down to a thin edge; do not make the trailing edges paper thin, allow sufficient thickness for strength.

After the leading and trailing edge strips are sanded, cut two center plates from 1/32" sheet, one for the wing and the other for the stabilizer. These should be cemented to the center ribs and leading and trailing edges at the center of their respective surfaces. They provide a firm base where these surfaces contact the fuselage.

Now the stabilizer under surfaces may be covered with paper, one-half at a time, cutting the paper so that there is 1/4" of extra paper all around the stabilizer sheet, and so the sheet is about 1/2" longer than one-half the stabilizer. Start by cementing the paper at the center of the stabilizer with 1/4" overlapping the center line. Then cement the paper to each rib successively, and to the stabilizer tip, drawing the paper tight spanwise. Then cement the paper to the leading and trailing edge strips, pressing it down tightly to all cemented surfaces. Cement paper to the other half in a similar manner. Dope is the best medium to use for this purpose. Apply dope to the paper around all edges as it is glued in place—this helps to anchor it firmly. Then spray or paint the whole paper surface with dope. After sanding the balsa upper surface of the stabilizer, dope may be applied to this also. This insures a smooth finish on both paper and wood. The paper should be applied to the wing in a similar manner.

Now you may tackle the fuselage. Cut out all bulkheads carefully, according to the pattern on the plan. The front and rear bulkheads are composed of two thicknesses of 1/4" thick balsa, each of the two thicknesses for any bulkhead being cut so their grain runs at right angles to one another when cemented together. This prevents them from splitting due to any twisting of the nose and tail plugs. The center bulkheads are cut from 1/8" hard balsa to the shape shown. When the bulkheads have been smoothed, cement them to the keel at their proper locations, shown in the sideview drawing. The bulkhead with the *square hole* is assembled to the *front end* of the keel, the one with the *round hole* at the *rear end.*

Just rearward of the front bulkhead, wedge shaped blocks should be cemented to each side of the keel strip and inside of these 1/32" strips, (see fuselage assembly and side view). Similar strips are cemented to the keel and to the rear bulkhead. These give strength to the fuselage at these points. Then cut two 1/32" thick strips, 5/16" wide and 23" long. These are cemented to the sides of the keel and lower sides of the bulkhead as indicated in the assembled sketch.

Next the fuselage sheet is formed by wetting one side of its entire surface. It is then curved around a broom handle or some other cylindrical surface with the dry side of the wood inward. Wetting makes it easy to curve the sheet. This sheet is 23" long, 3" wide, 1/32" thick. Do not wrap the sheet completely around the broom handle, allow the lower edges to droop downward so the sheet cross section forms a tear drop shape. This may be held with rubber bands until dry.

Then cement the sheet in place to the front rear and center bulkheads. This is done by applying cement to the surfaces of both bulkheads and sheet at the points of contact. Pin the sheet in place to the bulkhead, then cement the edges of the sheet to the keel strips throughout their whole length. This is done by spreading apart the edges of the sheet and applying cement to both the surfaces of the keel strips and the sheet balsa covering. Start at one end and do a few inches at a time and apply cement to the surface a few inches at a time. When finished press all glued surfaces together to make sure the joints are firm. To complete the fuselage round off the lower edges of the front and rear ends by cutting away the surplus wood, as shown on the sideview drawing. Then after sanding all of the fuselage surfaces smooth, sand the *keel* down about 1/64" on each side to reduce its weight.

Make the nose plug and propeller assemblies next. The nose plug is shaped from hard balsa with a hard wood (pine or bass wood) plug fitted into it through its rear surfaces. Gouge out the balsa plug so that this rectangular hard plug fits into it snugly and straight. The hard wood plug of course should be cut and trimmed to also fit snugly into the rectangular hole of the front bulkhead. Cement the hard plug into the conical balsa plug. Then drill a 1/32" hole down through the center of the hard wood and balsa plug. After shaping the front motor hook wire (as shown in the plans), with a loop at its front end, pass it through the hole in the plug and bend a hook on

its rear end. This hook will engage the front end of the rubber motor. This and other wire parts should be made from .040" hard wire. Slightly larger gauge may be used if desired.

Next bend the nose skid wire to indicated form and insert it in place, forcing the wire back through the front of the plug and the vertical rear end upward through the plug, so that when the plug is in place the rearward loop of the skid contacts the lower contour of the fuselage nose. Make other wire parts including the tail skid, gear and propeller shaft. Do not bend the hook on the propeller shaft until after you have passed it through the propeller and tail plug in the final assembly.

Cut out the propeller from a medium hard balsa block 7" long, 1-7/8" wide and 1" deep, as indicated on the plans. Draw diagonals on the block and cut away the block following these diagonals to form the propeller. Cut the concave faces of the blades first, following opposite diagonals on front and rear surfaces of the block. Then trim down the convex surface to the proper blade surface and contour. Make the blades so that their thickness tapers from hub to tip. After cutting the propeller blades out carefully, round the tips and trim down the edges. Complete the propeller by sanding it all over.

Then make the bearing plates and insert them on the front and rear hub faces. Be sure that the .040 dia. shaft holes in these plates are in proper alignment before the plates are forced into place and cemented. This may be done by cementing the rear one in place, passing the shaft through it and the propeller hub and threading the front bearing plate over the shaft. Then while the shaft is held true, force the prongs of the front plate into the propeller hub so it fits tightly. Do not cement it until you have made certain that the shaft is straight through the hub and the propeller spins true without wobbling. If necessary, remove the front plate again and readjust the position until the propeller spins true, then cement it in place.

The tail plug is made of hard wood with metal bushings inserted to serve as bearings. Small eyelets may be used, otherwise use small metal tubes of the correct diameter. There should be a collar on the rear end of this bushing as indicated in the assembly drawings. Another similar bushing should be inserted in the propeller spinner with the collar end forward. When all parts are completed, pass the shaft through the spinner, drawing the rear bent end of the shaft tightly into the spinner and cement it. Make sure that the loop which engages the propeller pin is properly formed and hugs the spinner closely. Cover all points of contact heavily with cement.

To assemble, place a thin washer over the shaft, pass the shaft through the propeller hub with *concave blade faces rearward*. Place two other small washers over the shaft and insert the shaft through the bushing in the tail plug. After bending the hook on the end of the shaft that engages the rubber motor, the assembly is complete except for forming and inserting the anchor pin (that holds the engaging pin) through the hole in the rear bearing plate and into the propeller hub. Make the hole in the hub first with a small pin, then insert and cement the anchor pin in place. The engaging pin is made with a loop at one end which hooks through the loop in the anchor pin. Bend the engaging pin so that it fits neatly through the shaft loop on the spinner and releases freely when the propeller is spun on the shaft.

All that remains to complete your plane is to cement the fin to the stabilizer, as shown in the drawing. Cement the two base strips to the sides of the fuselage and the head fin to the top of the fuselage at the nose. The landing gear also must be made, of course. The ends may be bent up after the wheels are in place so they will not slip off. The two base strips, which serve as a rest for the wing and stabilizer, should be made from 1/8" balsa sheet, each 1/2" wide and 13" long. Bevel their lower inner edges to fit the sides of the fuselage when they are in place as shown. The lower edges should be approximately 3/8" below the top surface of the fuselage throughout their entire length.

When these are in place, trim them away between the wing and the stabilizer and round down their upper front and rear ends. At the rear cement a 1/16" thick elevation block across them 1/4" forward of the tail plug. When the stabilizer is held in place by rubber bands, it rests upon this block, giving the stabilizer the correct angle of incidence. The forward end of the fin is held between two blocks 3/4" x 1/8" x 1/8" cemented to the upper surface of the fuselage on each side of the fin nose. The wing is given the correct angle of incidence by cementing a 1/8" thick block to the under surface of the leading edge at the wing center. Two loops of rubber

SICK MOTOR?

Do you have a worn-out or inoperative motor that you would like to pep up? Or a balky, inefficient motor you would like to see really RUN? Roy Clough tells you how in the August issue of M. A. N. You'll get lots of good tips from this article!

of proper length, passed through holes in the keel beneath the fuselage and up around the wing, hold the wing firmly in place. A small tail plug is inserted into the lower side of the fuselage at the rear to hold the rear loop of the stabilizer attaching band as in the drawing.

To finish the model, sand smooth with fine paper and cover all surfaces except the fin with dope. When completed, balance the model carefully on your fingers; it should balance at the C.G. point indicated on the drawing. If it is tail heavy, cut small chunks of lead to fit and cement into the eye of the head fin at the nose. When finished, the entire plane should not weigh more than 2-1/2 oz. It may be flown R.O.G. by using the detachable landing gear. Usually this ship is flown hand-launched without landing gear and wheels, to reduce its weight and increase its flight. The motor may be wound 500 turns by hand and 1000 turns with a winder when lubricated and stretched.

Make a few test flights at first with only a few turns, then "give her the works" and let her go after you have made certain that wing and tail adjustments are correct. Adjustments are simple; merely move the wing forward or back until the correct balance has been determined by gliding. Good Luck!

World War I

(Continued from page 23)

This new Roland airplane, eventually designated Rol C.II (L.F.G. planes were coded after the designer rather than company initials), was basically an Albatros C.I (coded Roland C.I because it was built by L.F.G.) but through ingenious engineering was lighter, stronger, and faster than its "prototype."

Changes most noticeable in the Rol C.II over its inspirational C.I were in the equal span biplane wings which were 10.3 meters tip to tip, the deep, gap-filling fuselage which gave the plane an over-all length of 7.7 meters, and its height, 2.9 meters. Instead of two bays of solid wood struts braced with a maze of wires, the C.II sported a single "I" strut of plywood and steel tubing in each right- and left-hand wing panel. Wing chord in both planes was 1.55 meters and gap was 1.40 meters. Total wing area was 26 square meters.

When the visiting Berlin army officials finished their inspection of the very first Roland C.II, one of them stood back, squinted his eyes, and said: "This airplane looks like a *whale!"* . . . but he used the word "walfisch," whale in German. Thereafter, the Roland C.II was seldom referred to by its official designation, and everywhere it appeared, or was discussed, it was referred to as "der walfisch."

AT THE FRONT. There were many "super" planes designed and built during W. W. I that never got any further than experimental in status, but the Roland C.II was one of those "super" types that actually got into the fighting. As events turned out, it was a better psychological fighting machine than it was an actual terror of the skies.

When the first two Rol C.II's were received by the Bavarian Abteilung No. 4 (observation squadron 4) talk flew thick around the pilots' lounge and mess hall. Each man could see faults with the machine because it was so radically different from the crude Albatros and L.V.G. types they had been flying. Yet through their criticism ran a thread of wonderment at its sleek lines, the way the wing stubs faired into the fuselage; they marvelled at the spacious cockpits that not only shielded them effectively from the wind, but were so deep windows were provided in the fuselage to improve visibility.

Pilots of Abteilung No. 4 wondered at another thing—there was no forward firing machine gun—the only armament was a ring-mounted Parabellum for the observer. The answer was simple—the Rol C.II had a top speed of between 103 and 105 mph—equal to or better than the Sopwith Pup or Nieuport 11 it would meet in combat.

This was during the winter of 1915-16. The war in the air was just getting a good start and the Roland C.II contributed to it by commencing patrols in November of 1915. As enthusiastic as the pilots were on the ground, they found little in the Roland C.II to cheer about when it was in the air, outside its speed. For what appeared to be a good climber, the C.II performed little if any better than its less streamlined contemporaries. It climbed to 1000 meters in 6 min.; to 3000 meters in 25 min. and reached its ceiling—4000 meters—in 45 min.

But it was appreciably faster and with its three-hour fuel supply, could cover considerably more ground. In flight the Rol C.II was longitudinally stable, but had a tendency to "hunt" in straight flight. This characteristic was caused by the deep fuselage and an insufficient vertical fin area, and required constant footwork on the part of the pilot. Stall characteristics of early models were poor. Early C.II's gave little warning, dropped off violently to the right or left. This was corrected in later models by washing out the flat lower wing of the early types.

The Roland C.II was generally light on the controls except at low speeds. Because of its aerodynamic cleanliness, it glided flat and fast, approached at about 70 mph and was usually landed at around 55 to 60 mph.

The two Roland C.II's assigned to Abteilung No. 4 that winter early in the infancy of military aviation, were flown by Eduard von Schleich and Max Mulzer; both these pilots later graduated to single seaters, were among Germany's earliest aces, and for their exploits were awarded Germany's highest decoration, the Pour le Merite.

CONSTRUCTION. Structure of the Roland C.II showed as much inventive genius in many cases as did its over-all design. The fuselage was of particular interest because it was one of the first, if not the first, semi-monocoque structure to be produced in quantities.

Heart of the fuselage was a pair of very heavy six-ply formers, the forward one determining the firewall and the aft former separating the two cockpits. The entire airplane was built around these two members. The formers were connected by four heavy longitudinals interspersed with lighter longerons and stringers to preserve the oval cross section. Ash engine bearers were attached to the forward former at about the middle, with wing attachment fittings near the top and forward landing gear strut fittings near the bottom.

The rear landing gear struts were attached to the aft former which also

(Turn to page 56)

carried the major anchorage fittings for longerons and stringers running rearward to the tail. Secondary formers for the purpose of preserving the oval fuselage cross section were notched to receive these longitudinals, and the entire structure was glued and nailed together.

Except for metal at certain points, the entire fuselage was covered with very thin three-ply veneer applied in long strips and spirally wound around the superstructure. The shell thus formed was covered with fabric, heavily doped and sanded.

Next month we will continue this discussion of Roland C.II structural details and will present more pictures of this highly advanced W. W. I airplane.

Wee Bipe

(*Continued from page* 31)

then bend the back piece to suit. Having soldered both pieces together, insert the unit into the slots cut in the bottom of the body, locating the sections that run through the body precisely as seen on the side view. Or the two wire pieces may be inserted separately and soldered after they are in position. Either way, the slots are filled in with 3/32" sheet balsa. The 1/8" sheet fill between front and rear struts is cut to shape, press fitted and cemented.

WINGS. Both top and bottom wings are cut to profile from medium hard 1/8" thick sheet balsa. The wood should be fairly flexible, a quality detected with the fingers. The high point of the camber is one-third back from the leading edge; then round toward both edges with a sanding block. Taper the thickness at the tips. Inasmuch as there is no dihedral, both wings now can be cemented into the fuselage notches, but check carefully for alignment. The upper wing is mounted at a slight negative angle. The I-shaped interplane struts are made from 1/8" sheet balsa; use the side view of the strut as a pattern, allowing sufficient excess wood at either end to make up for the slant of the strut (as shown on wing view). Trial-fit the struts, then cement in place. Note that a piece of 3/32" diameter aluminum tube is used as a line guide. One end of the tube is flattened, and is cemented to a notch cut in the side of the interplane struts. Grommets take the lines through the fuselage sides.

FINISHING. After all surfaces are sanded smooth (before assembly, of course), the entire airplane is given a coat of Testor's sanding filler, then sanded with wet-and-dry paper. A full strength coat of red dope is then applied, followed by a half-and-half coat of red and thinner. This is the minimum if painting is required. The original had four coats of red sprayed on. Fuel proof the outside surface and the interior of the nose compartment. A spinner can be made from a soft balsa block. If a very close fit is worked out, the spinner can be pressed in place; once the fit loosens, build it up again with cement. The celluloid windshield and trim completes the job.

PHOTO CREDITS

Page		
4	Lower	Les McBrayer
5	All	Les McBrayer
16-17	All	N. A. C. A. Photo
19	Top	Acme
	Center	Fairchild Aircraft
	Lower	International
23	All	Robert C. Hare
	Above	Acme
	Below	Wide World

SUPERMARINE S-4

The S-4 was a British Schneider Cup racer and a real beauty. Although the prototype was a twin-float seaplane, our plans in the August issue show how to make it with either floats or wheels. This sleek controline racer should be a natural for Team Racing.

Scrap Box

(*Continued from page 2*)

write S. W. Wantin, 42 Ixia Rd., Wychwood, Genniston, Transvaal, South Africa.

Not long ago we told C. O. Wright, AMA president, that we thought contest modeling had become far too technical and complicated for the average kid. C. O. in his usual level-headed fashion commented that perhaps we need more events (or was it meets?) for the beginner. Well, it certainly is obvious that something should be done for the beginner. Anyone who has delved into the problem knows the pros and cons. But never, never, have we seen so many of the factors crammed into a single argument such as the one Clarence Wells, Sec. of *Bristol Aeromodeleers* (Bristol, Pa.), here cuts loose with.

"Have you heard of the National Exchange Club's 'Open-Age-Contestants-Prohibited' program for future contests? Seems as though they are tired of seeing the same old hot rocks win at their meets—and who isn't? But they take the simplest solution, one that took minimum thought and effort, and banned the older fellows. If they had merely banned the Open boys from the choice prizes, it would have been okay, for a good sport doesn't care what he wins as long as he is competing. The trophy hogs will stay home.

"But the outright banning of older fellows," claims Wells, "will definitely put modeling behind the eight ball. In the case of Exchange, clubs that supposedly are Exchange-sponsored actually get most of their support from the older fellows. I can't get our sponsor, the Bristol Exchange, out to find what a model is; they are as interested as jelly fish in the middle of the Sahara.

"Last year's meets where there were plenty of prizes, with us older fellows to take the juniors and help them, had only enough entries to go down to fifth place. There was only one Class C Jr. free flight entrant at the Philadelphia Flying Circus and one entry Class A Speed Jr. at the Pennsylvania State Championship meet at Reading.

"We have been pushing Junior meets in our clubs since 1948," Wells winds up. "The most entries we ever had out of 30 eligibles was seven. I had to twist the arms of these seven to get them to compete but *all of them would go to the field and sport fly all day.* (Italics are ours—Ed.) Looks like we had all better plan meets sponsored for the model builder and forget about sponsors who are afraid to take time out to look at a model. Why mince words, I am mad!"

Wells raises a lot of questions; he highlights a great many problems. Some of his points not only deserve discussion as interesting comments, but actually state squarely an issue that needs to be realistically faced. Do we have the right method of interesting the beginner? Will the beginner compete? Should the older man be barred? This last will tear down the house, so before the poor old "Scrap Box" gets slam-banged for merely quoting its contributors, the answer is a definite NO. The enthusiasm and love of the hobby that has carried along these fellows until they were old enough to be classified as Open is the kind of stuff that holds the entire picture together. Rule them out and the result may be bad. Bill Clark, the chap from State College, Pa., who did the slow burn in the May issue, touched off a kind of chain reaction. For instance . . . "First of all, I would like to know how the present free flight rules restrain originality?" asks Don Hobel, *Buffalo Flying Bisons*. "About the only thing they eliminate is the over-powered model that practically climbs out of sight in 20 sec. There is no reason why you can't fly wings or pushers. It may be pretty tough to keep up with the speed experts but, unless you use a ten-year-old motor, it isn't hard at all to free flight with 100 oz. power loadings.

"I like the idea of an unlimited class, such as Clark suggested," continues Hobel. "My idea would be to have Class A from 0.0 up to .05, B from .05 up to .20, C from .20 to .30, and D unlimited for *any* engine up to

BIG BIRDS

A "*Big Bird*" won the Rubber Cabin event in his class for Manuel Andrade, at the '48 Nationals. The ship gained this name from the large size (300 sq. in. area) and from the characteristic slow, wheeling flight. Here's your chance to build a sure winner from Andrade's design—you'll find plans in the August issue of M.A.N.

AUDIO TONE R. C.

There is nothing new in the principle of remote control by audio tones. The system is many years old; but adaptation to model aviation uses in a light practical system is new. E. L. Rockwood tells how it is done in the August issue of *Model Airplane News*.

1.5 displacement. Would also like power loadings raised to 120-150 oz., with a 7 or 8 oz. loading per 100 sq. in. of wing. On the whole, the free flight rules are the best yet, especially the ten-minute limit. I flew a 49 oz. job with a *Torpedo 29* and got 2 min. on a 15-second run, so 150 oz. loading isn't hard to fly."

Die-hard speed flier, Joe Campione, gives us the needle by sending a clipping from the WESTERN MODELER. Under the heading "Speed Flying: Its Future," by Jim Saftig and Ed Havlik, a potent defense is made of speed, mainly by the process of counter-punching the people who say something should be done about it. Joe wants to see us put this in the *"Scrap Box."* We'll do more than that, Joe.

Boiled down, these arguments state that speed is a sport, that when a man becomes proficient in any sport, he competes against other proficient men in a kind of professional class. As to danger, the boys say that any sport can be put in the same category, such as football which bangs up and occasionally kills its devotees. Don't slow down the ships, they say, but work toward increased safety. To this end, they say further that the new line diameter rules are okay, that lines should increase if speeds go up. But why, they ask, slow down a good model with a flock of heavy wire? Keep the wire right for safe stress, but don't go overboard.

Have speed jobs made without bell-crank stops so that they cannot be flown on one wire when full up or down elevator becomes necessary, Saftig and Havlik wrote. The fence is the best deal in their estimation. Good barriers are being developed. By leaving minimum space outside the circle, these fences will stop the dangerous wandering contestant who walks about the middle of the circle before getting on the pylon.

"Many fliers feel they are getting a bum deal just because a lot of malicious propaganda is being spread about their phase of modeling and its dangers," commented Saftig and Havlik. "We wish to say that we would like to see 'all out' speed continue as never before BUT have the necessary precautions taken."

Now, Joe Campione, we feel that when these two experts and authorities say that precautions must be taken, they have hit the nail on the head. It is plain from many letters received over the past several months that the thinking speed flier of the die-hard variety (and you read Cayton's comments above) believes better safety measures is the crux of the matter. In theory, safety measures should minimize, if not virtually eliminate, the accidents. In practice they have failed to do so. The gap between theoretical safety measures and applied, practical safety measures is what all the shooting is about.

First of all, there is no such thing as malicious propaganda, at least in this field and discussion. Some people say speed is dangerous. How about the U-control meeting at Olathe? Wasn't is preoccupied with safety, and so involved with a wild variety of what-might-be-done suggestions, that it got nowhere? Didn't we see the country's experts—almost all of them—who were present, discussing the problem? Didn't Keith Storey and Les MacBrayer seek to convince us on the possibilities of team racing, mostly because we had wondered ourselves about the semi-scale model. These two men are among the top speed fliers. How come they think it dangerous—oh, not for the expert, the professional, as Saftig and Havlik call him—but for the so-so flier who steps over his head into the fast time. Doesn't Walker speak of the many close ones he has seen in his travels, in arguing for the use of a fence? How about that nationally known chap who swore off speed for good reason? No, fellows, you yourselves, the speed men, say these things.

Saftig and Havlik clarify a fundamental concept of the question when they touch on the "professional" flier. Who worries about the professional? But you can go into any hobby shop and buy the fastest airplanes and engines in the world—and fly them. No, it isn't the professional that bears watching—though either way he is the one that quickly defends his beloved speed. It is the average Joe. Fortunately, the entire issue is in the open and many minds are working toward safe flying. Why they can't get together, set up some safety group that would make ironclad recommendations to be enforced without deviation, is beyond us.

The place of theory in aeromodeling is a perennial issue. We'll never forget Sal Taibi's look of bafflement on hearing some guy with dark rimmed glasses read a technical paper at a meeting in the east. Sal, of course, needs no introduction. The other chap—well we can't even remember his name. Theory, of course, does have an important place if it is interpreted in terms of experience. If it isn't, one would not be able to understand what was wrong with a ship that began life as a clunker. On the other end of the see-saw you find a chap like Hank Cole. Hank goes all out on his theory and is a prominent contestant to boot. "What place does math have in model design?" we recently asked Hank.

"On that indoor stuff—remember the work Hewitt Philips did back in 1938," answers Cole. "He wrote the endurance equation and then determined the optimum rubber weight ratio for maximum endurance. My method is an extension of the same idea but includes structural factors to determine optimum aspect ratio, rubber-weight ratio, and optimum type of construction. It took me two months to complete the structural and aerodynamical analysis and required a knowledge of differential calculus. However, I think the value of the method was proved by the performance.

"Before the Nationals, the model was never flown in a hall larger than my front room," continues Cole. "At the Nationals one test flight was made for 19:30. The first official was 23:30 with 2000 turns. The next flight hung up at 7 min., was dislodged and hung up again at 10 min., dislodged again, and finally landed after 28 min., though, of course, this could not count as an official time due to the interruptions. The next flight with 2050 turns was 23:42, which is all the flying done under a high ceiling. The motor has been wound to 2800 turns which I am sure would keep the ship up for over 30 min.—if I could find a ceiling high enough." Hank, incidentally, won't be at the Nationals this year. He is involved with a research project dealing with the effect of structural flexibility on the rolling performance of swept-back wings, with various lateral control devices.

Dick Korda, we see, is using those English type plug-in wings on his new Wakefield, which he says is a "streamlined box." That sounds like the English influence, Warring in particular. Chet Lanzo is another Ohioan interested in English Wakefields. Last year, Chet flew one of Warring's ships under an exchange plan. Warring was to try Chet's American job under English conditions.

Don James thinks we would be interested in the *Thermal Thumber* Sports Contests, which have gone over successfully on the Coast. The idea is to get a three-flight total of 4-1/2 min. with an engine run of between 20 to 30 sec. Loads of fun and the realistic type naturally are best, advises Don. Rules further state any size model, no wing area, power loading, or cross section requirements. Don, that's for us!

George Temple, well-known British modeler, has some inside info on speed in Great Britain. He believes weather has a lot to do with their not being able to approach our speeds, basing this conclusion on the fact that English ships are now the equal of ours. Prop design and fuels have a lot to do with it, though. While Temple doesn't compete in speed contests, due to the unfair advantage he has through influential contacts who supply special fuel ingredients, laboratory tests, wind tunnel tests, etc., he was doing (last fall) 130 on a .30, and 144-148 with a Fox, using his own fuel and props. Temple is an old fighter pilot and motorcycle enthusiast who knows how to rebuild engines. His speed jobs are all alike: swept-forward wing, butterfly tail, boom fuselage, double cowling and swirl venturi, single-blade swept-back prop. He

also goes in for variable compression heads, "swill-pot" fuel systems, Champ glow plugs.

Temple now is building a model to attack the Official World Speed Record. No, this isn't a California mark; it isn't even an American record. The rest of the world (what world sez we?) flies under the F.A.I. rules. This is an official free flight speed record. Rules are tough, as are all F.A.I. rules, being the average of two ways over a 100 metre course (longer than a football field) with a wing loading minimum of 16 oz./sq. ft. Temple's answer is a twin-engine machine with a special low-lift airfoil and remote control. "However," says George to show he is like the rest of us, "it probably will run wild and turn and rend its constructor."

Speaking of math and theory, Temple tells this one. It seems that some of the theory boys over there worked up a super-duper airfoil that had its maximum camber point very far back on the chord. This section was put to test by Temple and a friend who, after many fair climbing flights, but no glide whatsoever, were sitting in the kitchen disconsolately. Slide rules and obstruse calculations littered the table. Just then George's mother passed by, picked up the wing, and said, "But it is obvious—this airfoil should fly perfectly if you turned the wing back end front. Why not try it?" So amid many laughs at the joke, the wing was turned around with the trailing edge front. And the model flew out of sight!

And for that George Temple, the free subscription to MODEL AIRPLANE NEWS for the best Tall but True Story of the month.

Flash

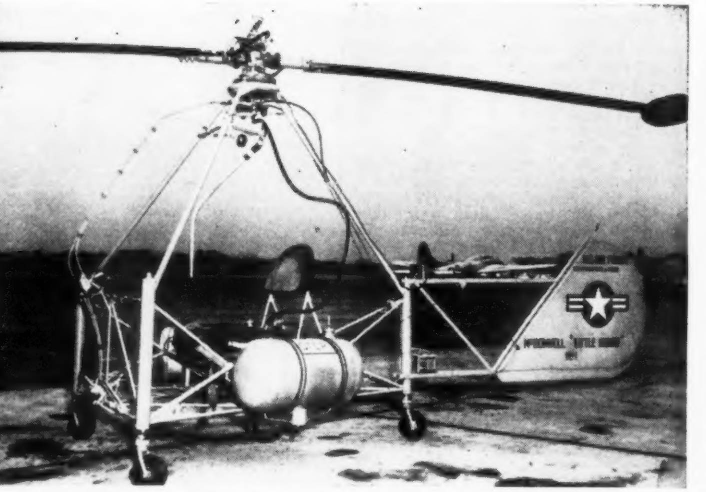
(*Continued from page 9*)

ground attack planes for Army support operations, new helicopter development, and development work on a "particularly promising" guided missile.

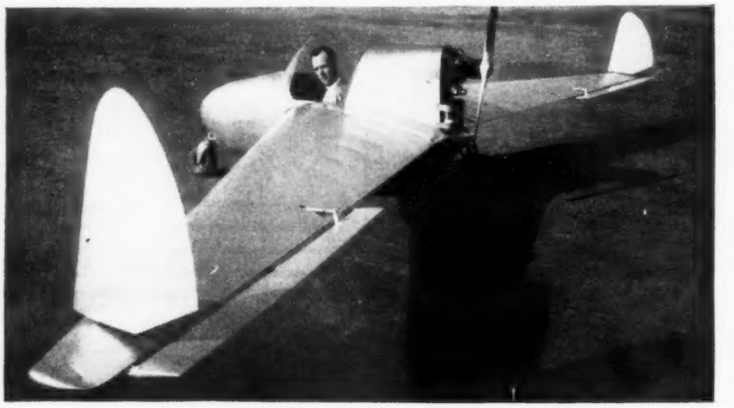
WHILE NAVAL aviation takes a hard punch, the total U.S. Air Power won a smashing victory in its fight for recognition by the Congress, and the fiscal 1950 program for the procurement of 3393 new aircraft at a cost of $2,904,000,000 represents a level of industry production and air power strength that is in full step with the scheduled program of 70 Groups for the Air Force by 1955, a "target" date for possession of the atomic bomb by the Russians.

IT IS A SAD duty to report the death of Art Chester, veteran air racing pilot, in a pylon turn at the Gold Cup air races near San Diego, Calif. Chester was flying his famed "butterfly" tailed Chester Special when it suddenly nosed up, stalled and slipped into the ground. Believe it or not, Chester had participated in every National Air Race since they started (an honor he shares with Steve Wittman). Few but his closest friends knew that youthful, blonde Art Chester was nearly 50 years of age, but had all of the energy and skill of his youngest competitor. Chester received his pilots license in 1921 and won his first prize money in an OX-5 powered *Travelair* biplane; he received $100 in the 1929 National Air Races! Chester was the guiding light behind the Professional Race Pilots Association, which pioneered safe rules for light racing planes, as used in the famed Goodyear Trophy events at recent air races.

HUGE CONVAIR B-36 has now been made even more deadly by the addition of four Allison J-35 turbojet engines suspended in twin pods under each wingtip. The added 16,000 lbs. of thrust lifted the huge ship off the runway at Convair's Fort Worth, Texas, plant 1500′ short of its customary 5000′ take-off distance on its first take-off. The composite-powered craft then climbed to 40,000′ and remained aloft for 3 hrs. 15 min. Convair plans addition of turbojet engines (General Electric J-47 5000-lb. thrust units) not only to future production models but to the 23 B-36's already in service with the 8th Air Force at Carswell Air Force Base, Fort Worth, Texas. The added power is expected to raise the top speed of the huge 150-ton



(Above) The McDonnell *Little Henry* ram-jet helicopter now has improved fuel system and burns ordinary auto gas. (Below) Robert Sebring of San Francisco seated in his tiny flying wing. Craft is made of plastic-bonded plywood and total cost was about $100. It weighs about 150 lb. and should cruise at around 65 mph



giant to upwards of 500 mph and its ceiling to 46,000′. Surely here is an extraordinary strategic weapon!

THE CIVIL Aeronautics Board has made its decision final to smash the nonscheduled air transport operators out of business. This includes hundreds of veterans who obtained GI loans to start their business in the postwar aviation picture, only to be put out of business now by another agency of the government. But the CAB feels that it can do nothing else. The scheduled airlines are still losing money, which must be made up by government subsidy. A substantial part of these losses have been created by the smart, low-cost air transport service offered by 100 large and some 2000 small nonscheduled airlines. Therefore, since the CAB is charged with regulating national air transport on a sound, economic basis, it has no alternative but to put the irregular carriers out of business so that the big scheduled airlines will have all of the available revenue for the transportation of people and goods by air. It's a tough decision but it is the law and will have to be obeyed!

THE SLEEK, deadly new Convair XP5Y-1 has been rolled out of its factory at San Diego, Calif., and final installation of equipment is now being made. The 125,000-lb. giant will be powered by four Allison T-40 turboprop engines, each developing 5500 hp! This tremendous power will give the flying boat a top speed of about 400 mph, the fastest big flying boat in history. Secret of the new design is its high "length/beam ratio" hull, which is long and narrow, thereby cutting down both water and air resistence. One of the features of the long-range boat is the comfortable living quarters for the crew so designed as to permit the boat to hide for days or weeks in a secret lagoon with power for lights, water, cooking, etc., provided by a small gas turbine engine generating compressed air, which operates various motors and electric generators. Delay in delivery of the engines will hold up the first test fight until mid-summer.

THE HIGHLY-touted British Avro *Shackleton* bomber has been revealed as simply a souped-up version of the wartime *Lancaster* and postwar *Lincoln* bomber. The new version features dual, counter-rotating propellers driven by 2450 hp Rolls-

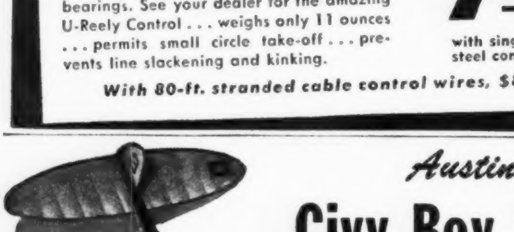
Royce *Griffon* engines. The nose has been redesigned for remote-controlled turrets mounted on either side. The fuselage of the *Shackleton* is larger and longer than its predecessors and the radome has been moved to a new location under the nose. But the 48-ton craft has a top speed of only 315 mph and a range of but 6000 mi. It is in production for the Coastal Command and will be used mainly for anti-submarine sea-search duties. Meanwhile, Great Britain is hard at work on its first jet bomber, scheduled to fly this year.

THE POWERFUL Pratt & Whitney *Wasp Major-VDT* engine apparently is going to die aborning. The huge engine, which developed more than 4,000 hp with the aid of a variable-discharge gas turbine in the exhaust tailpipe, was designed for installation in the Boeing B-54, a development of the B-50 of which 44 had been ordered by the Air Force. But the Air Force has suddenly cancelled this contract, which means the end of the VDT engine along with it. Now, it is revealed that the B-54 project had been intended as a "hedge" against the B-36 bomber not living up to expectations. Since the latter has proved such a tremendous operational success, the B-54 project is now thought no longer needed. Navy is also reexamining its Wright R-3350 compound engine project, which was scheduled for installation in the Douglas AD *Sky Raider* and the Lockheed P2V *Neptune*. Recent cutbacks in Navy funds plus the delicate balance between added horsepower and added engine weight and complexity may mean a similar summary fate for this engine. Both engine used the energy left in the engine exhaust to provide additional power, the Wright Turbo-Cyclone by gearing three exhaust-driven turbines back into the engine and the Pratt & Whitney Turbo-Wasp by exhausting the gases in a controllable jet nozzle as thrust.

DOUGLAS AIRCRAFT is now at work on the construction of the X-3 supersonic research aircraft for the Air Force. The project long was only a design study in the process of which Douglas engineers examined 60 different layouts. Evidently one was finally made to please the Air Force and the design study has been transformed into an actual construction project. The X-3 will be the fastest piloted aircraft ever built with a design top speed of 2500 mph at 200,000'!

ALTHOUGH the Berlin blockade will doubtless be lifted by the time this issue is printed, inside Pentagon sources say that the airlift will continue in spite of such a move to insure that the U.S. zone is supplied in the event the Russians suddenly change their mind. Therefore, the Air Force is going ahead with its high-capacity cargo plane procurement program. These center around the huge Douglas C-124 *Liftmaster*, an improved version of the C-74 *Globemaster* featuring a substantial increase in the volume of the interior. Douglas is already at work on 28 of the type but Air Force is readying plans calling for a large increase in this order. Air Force is also renewing interest in the monster Convair C-99, which recently smashed all records by lifting a payload of 100,000 lb.! This load was carried to an altitude of 6562' (2,000 meters) in order to qualify as an international FAI record.

THE NEW LOOK in tomorrow's Air Force fighters features swept-wings, pointed noses and flush air inlets. The pointed noses are to insure that the nose shock wave is attached and not a standing bow wave; the latter is extremely expensive in drag, with the attached shock wave less costly. The flush air inlets reduce external drag while providing improved air intake efficiency. But scientists of the NACA have recently revealed that for flight speeds above Mach number 2.5 the old-fashioned straight wing may be the best bet. Their supersonic wind tunnel tests indicate that an extremely thin airfoil with razor-sharp edges actually has less drag than the conventional swept wing at these high speeds. Engineers are still toying with the idea of an adjustable wing, straight for take-off and landing and swept for high speed. Now, it appears, they will also have to straighten the wing for really super high speed flight.



Longitudinal Stability

(*Continued from page 17*)

Stability, in its basic sense, concerns only *new* forces or the *change* in existing forces created by a disturbance from steady flight—such as a gust, and whether or not these forces act in such a way as to return the model to its original state of steady flight. We are not concerned with the original *trim* forces acting on the model which kept it in balance and in steady flight previous to the gust. In this respect, longitudinal stability is somewhat more complicated than directional stability where the trim force on the vertical tail is normally zero. Since the horizontal tail is always loaded with either an up or down force to balance out the wing lift, the thrust, etc., and so trim the model longitudinally, it is already developing lift before the model strikes the gust. *This original force is a trim force!* The ability of the tail to stabilize the model after the gust strikes, however, depends on its ability to develop *additional* lift—lift in addition to that already balancing the model. But how are these new forces developed?

In conformity with modern terminology, only two forces and a pitching-moment act on a wing or any lifting surface at any time. The lift acts at the *aerodynamic center* (A.C.) approximately the quarter-chord point; the drag acts at the same point, and a pitching moment acts about this point (Fig. 3). The *aerodynamic-center* doesn't change its location with the angle-of-attack, of the model. It's a built-in characteristic of the airfoil. The use of a single point of application of the lift and drag forces and the use of a pitching moment about this point is more convenient than the old idea of a *center-of-pressure* and its "travel".

From this we can easily see what happens to the simplest form of an airplane, a tailless or flying-wing airplane when it is disturbed by an up gust as it flies along in a trimmed condition (Fig. 4). As the gust strikes the model, an upward component of velocity is added to the forward motion which effectively causes a quick increase in angle-of-attack of the wing by the amount $\Delta\, a$, which is momentarily added to the original angle-of-attack, $\Delta\, a$. Consequently an increase in lift, Δ L, occurs which is in addition to the original lift L acting on the trimmed model, and both the increase in lift and the original lift act at the wing's *aerodynamic-center*. The amount of the increase in lift for a given increase in angle-of-attack, of course, depends entirely on the *slope* of the wing's lift curve and which in turn depends on the aspect-ratio. The change in drag and pitching moment can be ignored.

Obviously then, if the flying wing's *aerodynamic-center*, the point where the increase in lift acts, is *ahead* of the C.G., the model will nose up and loop over on its back when it encounters the gust, since not only does the increased lift cause rotation in this direction but the lift itself constantly increases as the angle-of-attack increases. We say then, that in this case, the flying wing is unstable or has negative stability. If the C.G. is *on* the *aerodynamic-center*, there is no rotation at all and the flying wing merely rises vertically—but doesn't nose up or down. It then has zero or neutral stability. If the *aerodynamic-center* is *behind* the C.G., it will have positive stability since the increase in lift caused by the gust will reduce the angle-of-attack and so return the wing to its original state of trim (Fig. 4).

Report From the West

(*Continued from page* 5)

the ground. Pappy Davis was there taking motion pictures. (Oh yes, we'll be calling him Grandpappy Davis soon.)

We saw Bill Cranford fly his .048 Mills (English) diesel in the ½ A class. Bakersfield was too warm for him, he didn't take his second and third flights. A lot of the old-timers will remember Bill; he was winning contests back in the 30's. This was his first meet since 1939. He did a lot of flying for Uncle Sam while in the Air Corps. In England he became acquainted with some English modelers and made a few swaps and now has a collection of English engines. Bill is a big booster for model flying on the West Coast. In addition to closing his airport at Artesia for two days to accommodate the Western All Free Flight Contest, June 4 and 5, he also donated a large sum to assure the success of the meet. Also seen at Bakersfield was Ace Boultinghouse flying his big monster, a 1400 sq. in. job powered by a *Spitfire*, which took second in *Class D*. Ace made the most beautiful flight of the day. It was very bright and warm and not a cloud in the sky; Ace took off, and after the engine cut, the ship immediately started thermaling. At the end of 10 min. it had drifted a little to the Northeast. The slight breeze shifted and Ace's ship came back over the field and dethermalized and landed on the field right in front of the crowd.

* *

The L.A.A.M. Annual Rubber meet was run off April 3, with some eighty fellows out packing in the turns in their jobs. Three A.M.A. records were broken. Winners were: *Class C rubber,* Leon Morris 17:46.6; *Class D rubber,* Al Trainor 13:59.7; *Wakefield,* Dick Schumacker 13:31.4.

Another record was broken in the West when Bill Barris and Dick Riedel flying the *Sunkist Lady* stayed aloft 1008 hr. to break the light plane endurance record of 726 hr. The gallant pair reached their mark on April 26.

A.M.A. Record Trials scheduled for April 17 at Long Beach were postponed because it was Easter Sunday. A big disappointment was handed to some friends of ours, who drove here from Las Vegas, Nevada (over 300 mi.), to attend the record trials. We are sorry this happened; please accept our apology.

The Long Beach Junior Chamber of Commerce is sponsoring a free flight gas contest which will be held July 10, 1949. Events include *Class A, B, C, & D.* The trophies will be furnished by the Long Beach Plymouth Dealers.

The Los Angeles Aero Modelers Free flight gas contest will be held June 26, 1949, at Los Angeles.

Team racing is getting off to a big start on the West Coast. The F.A.S.T. Club is sponsoring the meets held at Santa Anita parking area, Arcadia. For further information write to: F.A.S.T. Club, 737 South Pasadena Avenue, Pasadena 2, Calif. The following are the results of the first two meets held:

MEET No. 1 (Santa Anita Parking Area, April 10): *67 pts.*—Rudy Panko; *30 pts.*—Ormond S. Sutter; *24 pts.*—E. S. Hartramft; *7 pts.*—R. E. Westlake; *Beauty Event*—Ormond S. Sutter.

MEET No. 2 (Santa Anita Parking Area, April 24): *67 pts.*—E. S. Hartramft; *52 pts.*—Larry Johnson; *30 pts.*—Phil Randolph; *10 pts.*—Ormond S. Sutter; *Beauty Event*—Larry Johnson.

The next two meets will be held at Santa Anita on May 15 and 29.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*McCoy 19	10.95
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*Wood Reel 6" dia.	.50

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Class A, B, or C

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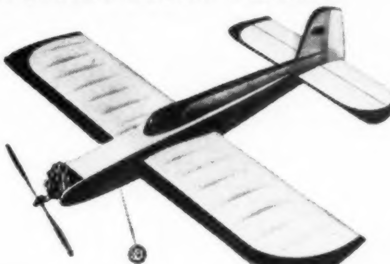
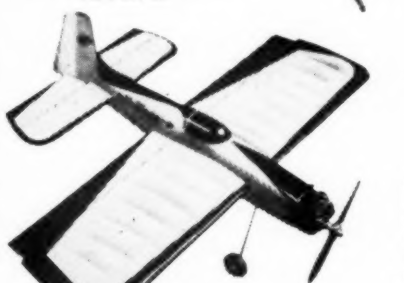
BUILT BY THE MAKERS OF VECO WHEELS FOR MC COY 19, 29, O & R 23, 29, FOX 35





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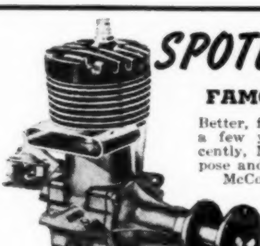

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*2-60' Stranded wire	2.95	Aero Condenser	.35	*Baby Timer	1.50
*2-70' Stranded wire	3.25	Metal Condenser	.30	*Flex Needle Valve	1.00
*2-3' Lead Ins	.40	*Booster Plug & Socket	.50	Universal Needle Valve	.50
Spark Plugs (all sizes)	.50	Toggle Switch	.50	*Battery Box (all sizes)	.40
*O&R Glow Plug (V & V2)	.85	Slide Switch	.25	*Lucite 4-pencell B. Box	.75
*O&R Racing Plug (V&V2)	.85	Neoprene Tubing		*Bell Crank (Lg.-Sm.)	.25
*Infant Glow Plug	.85	3/16" O.D. Ft.	.20	*O&R 60 Metal Fuel Tank	1.75
Arden Glow Plug	.85	¼" O.D. Ft.	.20	*O&R 23 & 19 Fuel Tank	1.50
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*Hap-The Pilot	.95

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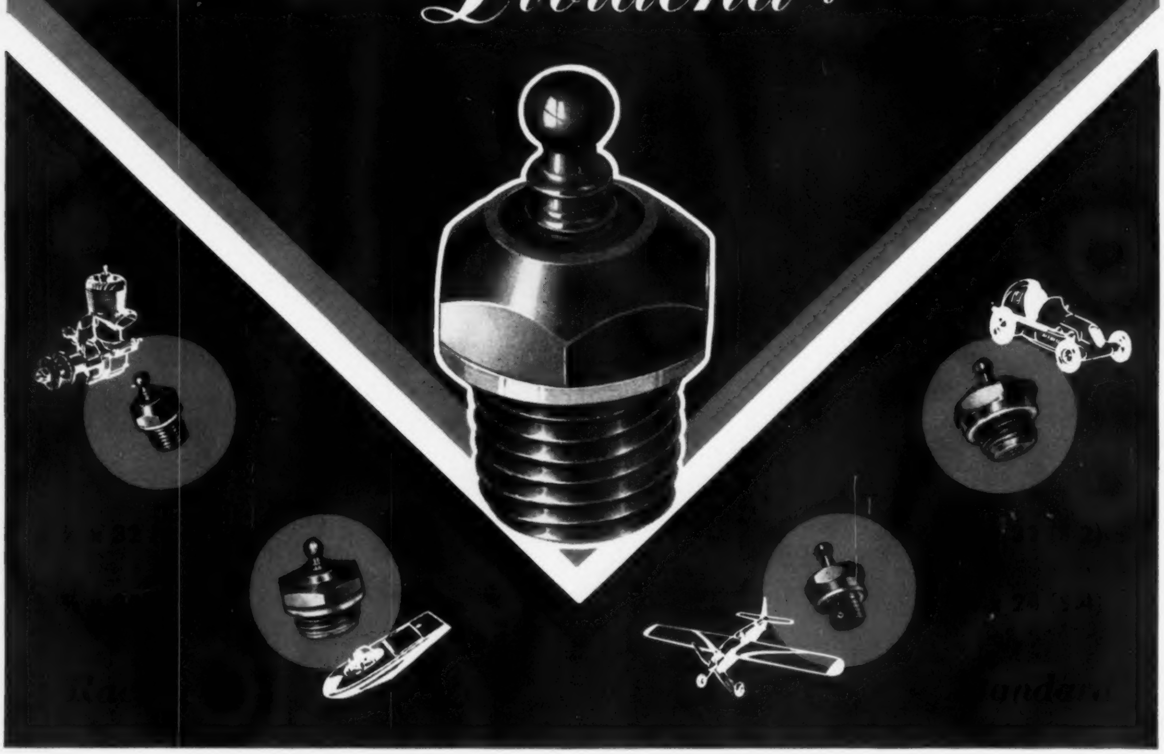
Ohlsson & Rice

declares another Dividend for modelers



... made possible by your preference for "Platinum Heart" Glow Plugs

NOW JUST 65c EACH

THE best news any modeler can read is that the cost of model flying has come down.

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Design, quality, and rigid inspection remain unchanged. And, like the reduction in O & R engine prices, this is the permanent new price level of Pow-OR-Team Glow Plugs, not a temporary reduction. In a word, the same famous "Glow Plugs with the Platinum Heart"—used by more modelers than any others at 85c—are now priced at just 65c apiece.

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